DILLON EDWARD

PORCELAIN

Edward Dillon

Porcelain

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Содержание

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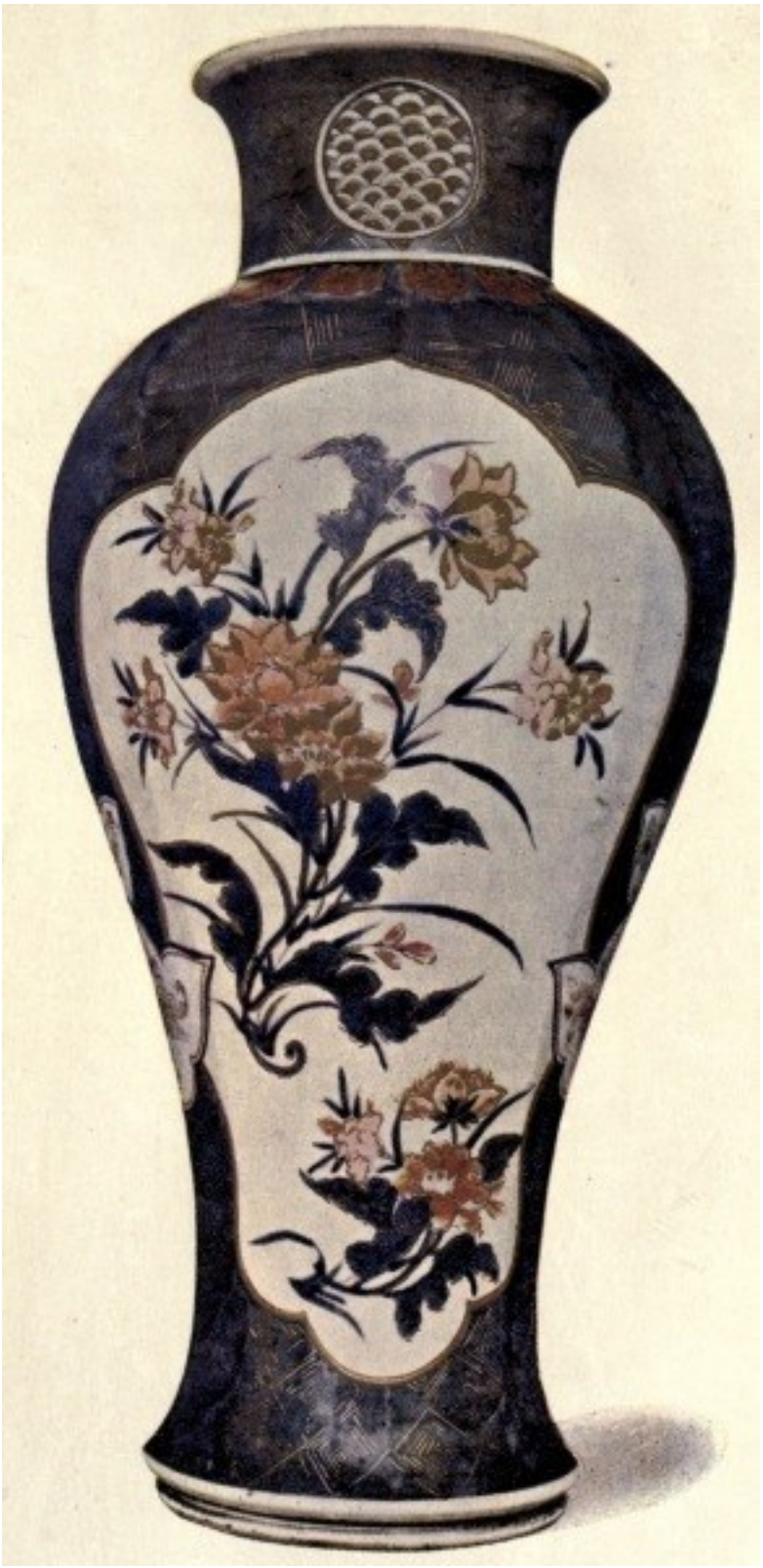

PLATE I. JAPANESE IMARI WARE

PREFACE

HOW extensive is the literature that has grown up of late years round the subject of porcelain may be judged from the length of our 'selected' list of books dealing with this material. Apart from the not inconsiderable number of general works on the potter's art in French, German, and English, there is scarcely to be found a kiln where pottery of one kind or another has been manufactured which has not been made the subject of a separate study. And yet, as far as I know, the very definite subdivision of ceramics, which includes the porcelain of the Far East and of Europe, has never been made the basis of an independent work in England.

It has been the aim of the writer to dwell more especially on the nature of the paste, on the glaze, and on the decoration of the various wares, and above all to accentuate any points that throw light upon the relations with one another—especially the historical relations—of the different centres where porcelain has been made. Less attention has been given to the question of marks. In the author's opinion, the exaggerated importance that has been given to these marks, both by collectors and by the writers that have catered to them, has more than anything else tended to degrade the study of the subject, and to turn off the attention from more essential points. This has been above all the case in England, where the technical side has been strangely neglected. In fact, we must turn to French works for any thorough information on this head.

In the bibliographical list it has been impossible to distinguish the relative value of the books included. I think that *something* of value may be found in nearly every one of these works, but in many, whatever there is of original information might be summed up in a few pages. In fact, the books really essential to the student are few in number. For Oriental china we have the Franks catalogue, M. Vogt's little book, *La Porcelaine*, and above all the great work of Dr. Bushell, which is unfortunately not very accessible. For Continental porcelain there is no 'up-to-date' work in English, but the brief notes in the catalogue prepared shortly before his death by Sir A. W. Franks have the advantage of being absolutely trustworthy. The best account of German porcelain is perhaps to be found in Dr. Brinckmann's bulky description of the Hamburg Museum, which deals, however, with many subjects besides porcelain, while for Sèvres we have the works of Garnier and Vogt. For English porcelain the literature is enormous, but there is little of importance that will not be found in Professor Church's little handbook, or in the lately published works of Mr. Burton and Mr. Solon. The last edition of the guide to the collection lately at Jermyn Street has been well edited by Mr. Rudler, and contains much information on the technical side of the subject. On many historical points the notes in the last edition of Marryat are still invaluable: the quotations, however, require checking, and the original passages are often very difficult to unearth.

In the course of this book I have touched upon several interesting problems which it would be impossible to thoroughly discuss in a general work of this kind. I take, however, the occasion of bringing one or two of these points to the notice of future investigators.

Much light remains to be thrown upon the relations of the Chinese with the people of Western Asia during the Middle Ages. We want to know at what time and under what influences the Chinese began to decorate their porcelain, first with blue under the glaze, and afterwards by means of glazes of three or more colours, painted on the biscuit. The relation of this latter method of decoration to the true enamel-painting which succeeded it is still obscure. So again, to come to a later time, there is much difference of opinion as to the date of the first introduction of the *rouge d'or*, a very important point in the history and classification of Chinese porcelain.

We are much in the dark as to the source of the porcelain exported both from China and Japan in the seventeenth century, especially of the roughly painted 'blue and white,' of which such vast quantities went to India and Persia. So of the Japanese 'Kakiyemon,' which had so much influence

on our European wares, what was the origin of the curious design, and what was the relation of this ware to the now better known ‘Old Japan’?

When we come nearer home, to the European porcelain of the eighteenth century, many obscure points still remain to be cleared up. The currently accepted accounts of Böttger’s great discovery present many difficulties. At Sèvres, why was the use of the newly discovered *rose Pompadour* so soon abandoned? And finally, in England, what were we doing during the long years between the time of the early experiments of Dr. Dwight and the great outburst of energy in the middle of the eighteenth century?

The illustrations have been chosen for the most part from specimens in our national collections. I take this opportunity of thanking the officials in charge of these collections for the facilities they have given to me in the selection of the examples, and to the photographer in the reproduction of the pieces selected. To Mr. C. H. Read of the British Museum, and to Mr. Skinner of the Victoria and Albert Museum, my thanks are above all due. To the latter gentleman I am much indebted for the trouble he has taken, amid arduous official duties, in making arrangements for photographing not only examples belonging to the Museum, scattered as these are through various wide-lying departments, but also several other pieces of porcelain at present deposited there by private collectors. To these gentlemen, finally, my thanks are due for permission to reproduce examples of their porcelain—to Mr. Pierpont Morgan, to Mr. Fitzhenry, to Mr. David Currie, and above all to my friend Mr. George Salting, who has interested himself in the selection of the objects from his unrivalled collection.

The small collection of marks at the end of the book has no claim to originality. The examples have been selected from the catalogues of the Schreiber collection at South Kensington, and from those of the Franks collections of Oriental and Continental china. For permission to use the blocks my thanks are due, as far as the first two books are concerned, to H. M.’s Stationery Office and to the Education Department; in the case of the last work, to Mr. C. H. Read, who, I understand, himself drew the original marks for Sir A. W. Franks’s catalogue.

In a general work of this kind much important matter has had to be omitted. That is inevitable. I only hope that specialists in certain definite parts of the wide field covered will not find that I have committed myself to rash or ungrounded generalisations. Let them remember that the carefully guarded statements and the reservations suitable to a scientific paper would be out of place in a work intended in the main for the general public.

E. D.

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Chantilly. Chantilly, Gasnault, Macon.
Chelsea. Bemrose, Franks, Tiffen.
China. Burlington Fine Arts Club, Bushell, D'Entrecolles, Franks, Griggs, Gulland, Grandidier, Hirth, Hippisley, Julien, Meyer, Monkhouse, Du Sartel.
Coalport. Randall.
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Continental Porcelain. Brinckmann, Franks, Garnier.
Derby. Bemrose, Haslem, Tiffen.
Doccia. Ginori.
Dresden. See *Meissen*.
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CHAPTER I
INTRODUCTORY AND SCIENTIFIC

IT is with a comparatively small branch of the art of the potter that we are concerned in this book. Porcelain or china, in all countries except the one where it was slowly brought to perfection, has always remained something of an exotic, and even in China we shall see that it was the immediate Imperial patronage and the constant demand for the court at Pekin that brought about the great development of the art under the present dynasty. In Japan, the first independent country to which the new art spread, it was under the eye of the greater and smaller feudal lords, often in the very garden of their palaces, that the kilns were erected, while the ware produced was reserved for the use of the prince and his household. Both in China and Japan we shall find the decline of the art to go hand in hand with the advance of the demand for the Western market, so that by the beginning of the nineteenth century we lose all interest in the manufacture.

This dependence upon royal or princely support is equally prominent in the history of the shortlived porcelain factories of Europe. Their success or failure has generally followed closely upon the greater or less interest taken in them by the reigning prince, and few of these kilns survived the political changes of the end of the eighteenth century.

No doubt, within the last twenty years or so a certain revival has come about both in the Far East and in certain European countries, and that under totally different conditions from those which prevailed in the eighteenth century. Here and there, at least, the manufacture of porcelain has come within the sphere of the new impulses that have brought about such changes in the ‘Arts and Crafts’ at the end of the nineteenth century.

In its main lines, the history of porcelain is a very simple one. Slowly developed during the Middle Ages in China, the manufacture became concentrated at one spot, at King-te-chen, and there reached its highest development early in the eighteenth century. In Europe, the repeated attempts to produce a similar ware had about the same time been crowned with complete success in Saxony; while in England and in France a ware closely resembling in aspect the Chinese, but softer and more fusible, had been accepted as an equivalent. Speaking generally, then, we can make these three statements with regard to the history of porcelain:—

1. That the art had its origin and complete development in China.

2. That it has seldom flourished except under royal or princely patronage.

3. That porcelain, from the artistic point of view, is essentially a product of the eighteenth century, and that this statement is true in the main as regards the country of its origin, though in this latter case we must make a certain reserve in favour of the earlier wares.

Our subject may seem a simple one compared with some kindred branches of the industrial arts, such, for example, as the history of glass-making, or that of cloisonné and other enamels. We come indeed at more than one time into contact with both these arts, and it is just at these points that some of our chief difficulties arise. It is in view of such questions as these, and indeed of many others equally important in the history of porcelain, that the necessity of a thorough understanding of the technical and even chemical side of our subject becomes evident. Of course, if in discussing the different kinds of porcelain we are concerned only with their merits or demerits as artistic products, we can put aside these practical questions as ‘beneath the dignity of our argument.’ But such a treatment of the subject would land us only too surely in vague generalities and in an arrangement based upon personal caprice. We require, above all at the start, a firm basis, and this can only be found in a thorough comprehension not only of the technical processes that are involved in the manufacture of porcelain, but of the physical and chemical nature of the substance itself.

But first we need some kind of preliminary definition of what is meant by the word. Porcelain, then, is distinguished from other fictile wares by possessing in a pre-eminent degree the following qualities: hardness, difficult fusibility, translucency, and whiteness of body or paste. Any specimen of ceramic ware that possesses all these qualities may be classed as porcelain, and from a practical point of view, the more it excels under these heads, the better specimen of porcelain it is.

These were the qualities by which the porcelain brought from the East in the seventeenth century was distinguished from any ware made at that time in Europe. Our ancestors dwelt especially on the practical advantages of the hard glaze and the elastic compact paste of the new ware, which compared favourably with the easily scratched surface and the crumbly body of the earthenware then in general use.

The greater infusibility that accompanies this hardness was not a point of much importance to them, but they marvelled at the translucency of the edges, as of some natural stone, and we find absurdly exaggerated accounts of the transparency both of the original ware and of the imitation that they claimed to have made. Finally, they noticed that the whiteness of the surface was not given by an artificial layer more or less closely adhering to an earthy base, but was the natural colour of the paste to which the thin layer of transparent glaze merely gave the effect of the polish on ivory or on marble. What then was this hard, white, translucent substance? What wonder if from one end of Europe to the other, scheming minds—chemists, alchemists, physicians, potters, and charlatans —were at work trying to make something that should resemble it? The history of this long search is a very interesting one, but it would be impossible to explain its failures, its partial failures (these last resulting in a compromise—soft-paste porcelain), and the final success of Böttger, without, as it were, going behind the scenes, and giving some account of porcelain from a modern, scientific point of view.

And first let us say that, although when treating of porcelain from the historical and especially from the æsthetic standpoint (and this after all is our principal business in this book), it is well to take a wide grasp and include a whole class of china—I mean the soft-paste ware—which does not come up to our standard of hardness and infusibility, this is not the case when we are considering the physical, and especially the chemical, nature of porcelain. By confining ourselves, for the present, to true hard porcelain, we have the advantage of dealing with a substance which chemically and physically may be compared to a definite mineral species. Nay more, we propose here to confine ourselves to the consideration of the hard pastes used at the present day in the wares of France and Germany, neglecting for the present the softer and more irregular porcelain of the Chinese.

First as regards hardness, the surface of the paste of a true porcelain, when free from glaze, can be scratched by a crystal of quartz, but it is untouched by the hardest steel. That is to say, it would be classed by the mineralogist with felspar, and given a hardness of 6 to 6·5 on his scale.[1]

The freshly broken edge shows a white, perfectly uniform substance, a glassy or vitreous lustre, a finely granular texture, and a fracture conchoidal to splintery. When struck, a vessel of porcelain gives a clear, bell-like note, and in this differs from other kinds of pottery. When held against the light it allows, where the piece is sufficiently thin, a certain amount to pass through, but even in the thinnest splinters porcelain is never transparent.

If a thin section be made of a piece of porcelain, and this be examined under the microscope by transmitted light, we see, scattered in a clear, or nearly clear, paste, a vast number of minute, slender rods, and between them many minute granules (Church's *English Porcelain*, p. 6). These belonites and spherulites, as they have been called, doubtless reflect the light which would otherwise pass through the glassy base in which they float, and the partial reflection and partial transmission of the light may not be unconnected with the lustrous fracture so characteristic of porcelain. Their presence points to the fact that we are dealing with a more or less definite substance, one which may be compared to

[1] Some English porcelain is stated by Professor Church to have a hardness equal to that of quartz. See below, 'Bristol Porcelain.'

a natural mineral species, and not merely with a semi-fused clay, something between stoneware and glass. Now when we come to treat of the chemical constitution of porcelain, we shall find that this view is confirmed. This structure is developed in the paste by the exposure, for a considerable period of time, to a temperature of from 1300° to 1500° centigrade, a temperature which is sufficient to reduce all other kinds of pottery, with the exception of some kinds of stoneware, to a glassy mass. In the case of porcelain, this great and prolonged heat allows of a complete rearrangement of the molecules in the softened mass. The process may be compared to that by which certain minerals and rocks are formed in the depths of the earth.

We see, then, that not only from the standpoint of history, but on the basis of the physical properties and intimate constitution of the material, we are able to draw a sharp line between porcelain and other fictile wares. This distinction is even more definitely shown by a chemical analysis.[2]

We are dealing, as in the case of so large a part of the rocks and minerals of the earth's surface, with certain silicates of the alkalis and alkaline earths, with silicates of alumina above all. All natural clays used for fictile purposes consist essentially of silicates of various bases, such as alumina, lime, iron, potash, and soda, more or less intimately combined with water, and with the addition, generally, of some free silica. If the clay be good in working quality and colour, the next point the potter has to look to is the question of its fusibility. It may be said generally that the simpler the constitution of a silicate, that is the smaller the number of bases that it contains, the greater will be its resistance to fire. Silicate of alumina is unaltered at 1500° C., a temperature which may be taken as the maximum at the command of the potter. The fusing-point is reduced by the addition of silica, especially if some other bases such as oxide of iron or lime, or again an alkali, are present even in small quantity. But beyond a certain point the addition of silica raises the fusing-point, and it is important to note that it is this excess of silica that renders certain stonewares and fire-clays so infusible. In the case of porcelain, on the other hand, the resistance to high temperatures depends more upon the percentage of alumina present, and the absence or small amount of other bases. Thus in comparing the composition of different porcelains, we find that it is those that contain the most silica that are the most fusible, or rather, to speak more accurately, that become 'porcelainised' at a lower temperature.[3]

The relation of porcelain to stoneware on the one hand, and to ordinary pottery on the other, will be made clear by the following figures, which give the composition of stoneware, Meissen porcelain, and of a red Samian ware:—

	Stoneware.		Meissen Porcelain.		Samian Ware.	
Silica,	80	per cent.	58	per cent.	61	per cent.
Alumina,	12	"	36	"	21	"
Potash and Soda,	5	"	5	"	5	"
Lime and Iron,	3	"	1	"	13	"

[2] We have thought it well, once for all, to treat briefly of the scientific aspect of our subject, but those who are not interested in this point of view may pass over the next few pages.

[3] I shall return to this point in a later chapter. I lay the more stress on this fact, as it is often stated that the hard and slightly translucent stonewares, such as the Fulham ware of Dwight, which contains as much as eighty per cent. of silica, form one degree of a series of which true porcelain is the next term. The fact is, those who sought to make porcelain by a refinement in the manufacture of stoneware were as much astray as those who started from a fusible glass frit.

The refractory stoneware contains a large excess of silica over the amount required to combine with the alumina and the 'other bases.' In the easily fusible Roman pottery, the 'other bases' nearly equal in amount the alumina, while the Meissen porcelain not only contains less silica than the pottery, but the 'other bases' only amount to a sixth part of the alumina present.

But it is not enough for the manufacturer to discover a clay of which the chemical composition corresponds to that of the type of porcelain which he proposes to make. The question, as an experiment of Brongniart long ago proved, is more complicated. Brongniart weighed out the separate constituents for his porcelain—the silica, the alumina, and the alkalis—and from them he formed his paste. He found, however, that the paste readily melted at the heat of the porcelain furnace. The analysis then of any ceramic product can give us but an imperfect clue to the nature and properties of the ware. We want to know how the elements are arranged, and this can only be inferred from a knowledge of the materials employed in the manufacture. I will illustrate this point by comparing the composition of Meissen porcelain with that of our Dorsetshire pipe-clay, the most famous of our English clays, but a material not sufficiently refractory for use in the manufacture of porcelain. Both substances contain the same amount of alumina—36 per cent.; in the Poole clay (after removing the water) there is 55 per cent. of silica and 9 per cent. of 'other bases,' against 58 per cent. and 6 per cent. respectively in the porcelain. The composition, therefore, of the two bodies is nearly the same: the clay, while it contains more iron-oxide and lime than the porcelain, is poorer in silica.

True porcelain has indeed never been made from any other materials than those so long employed by the Chinese and first described by the missionary, Père D'Entrecolles, nearly two hundred years ago.

The two essential elements in the composition of porcelain are—(*a*) The hydrated silicate of alumina, which is provided by the white earthy clay known as kaolin or china-clay, a substance infusible at the highest temperature attainable by our furnaces (about 1500° C.); (*b*) The silicate of alumina and potash (or more rarely soda), that is to say felspar. But the felspar is generally associated with some amount of both quartz and mica, and is itself in a more or less disintegrated condition. This is the substance known as petuntse or china-stone. It is fusible at the higher temperatures of the porcelain kiln.

Of those substances the first is an immediate product of the weathering of the felspar contained in granitic rocks; while the second, the petuntse, is nothing else than the granite (or allied rock) itself in a more or less weathered condition.

We see, then, that speaking generally, granite is the source of both the materials whose intimate mixture in the state of the finest comminution constitutes the paste of porcelain. It thus happens that it is only in regions of primitive rocks, far away as a rule from centres of industry and indeed from the usual sources of the clay used for fictile ware, that the materials essential for making porcelain are found. By the term granite we mean here a crystalline rock consisting of felspar, quartz, and mica, and we include in the term gneiss, which differs only in the arrangement of its constituents. The many varieties of rock that are named as sources of kaolin and petuntse, such as pegmatite, graphic granite, or growan-stone, are as a rule varieties of granite[4] distinguished by containing little or no mica, and above all by the absence of iron in appreciable quantity. As felspar is also the sole or at least the principal element in the glaze with which porcelain is covered, it will be seen that it is the mineral with which we are above all concerned.

Now, of the three minerals that enter into the constitution of these granitic rocks (the others are quartz and mica), felspar is the one most easily acted on by air and water. The carbonic acid which is always present in the surface-water gradually removes the alkaline constituents in the form of soluble carbonates, the silicate of alumina which remains takes up and combines with a certain quantity of

[4] The china-stone of Cornwall might, in part at least, be claimed as an old volcanic rock, and that used in the Imari district of Japan is distinctly of volcanic origin. Both these rocks, however, consist essentially of a mixture of quartz and felspar.

water, and in this form it is washed down into hollows to form the beds of white crumbly clay known as kaolin. This is, of course, a somewhat general and theoretical statement of what happens. If we were to examine the actual position and geological relation to the surrounding rocks of the beds of kaolin in Cornwall and in the south-west of France, there might be some exceptions to be made and difficulties to explain. Where, indeed, as in many places in Cornwall, the kaolinisation has extended to great depth, the decomposition may have been caused by deep-seated agencies; in such cases the kaolin is often associated with minerals containing fluorine and boron.[5]

As for the other constituent of porcelain, the petuntse or china-stone, we have called it a disintegrated granite, and this is the condition in which it is usually excavated. It corresponds to the French *cailloux*, the stony or gravelly material as opposed to the clay. In French works it is not generally distinguished from felspar, and indeed some varieties of petuntse may contain little else. However, if pure felspar is used, the second constituent in granite or in petuntse, I mean quartz, will have to be added to our porcelain paste in the form of sand or powdered flint. The third constituent of the china-stone, the mica, is usually neglected: in many cases the mother rock contains but little, and what there is is eliminated in the washing. Mica is more fusible than felspar; the white variety, muscovite, is practically free from iron, and only from granite rocks containing this variety can petuntse suitable for the manufacture of porcelain be obtained. The importance of mica as an element of the Chinese petuntse has only recently been recognised (Vogt, *Comptes Rendus*, 1890, p. 43). As much as 40 per cent. of muscovite has been found in samples brought from China. The pegmatite of the Limoges district, on the other hand, contains only 30 per cent. of this white mica, and of this only a small portion passes into the paste. We have here, perhaps, the principal cause of the greater hardness and the higher softening-point of European compared with Oriental porcelain.

We shall see later on that this softer Chinese paste has many advantages, especially in its relation to the glaze and the enamels, but for the present we will continue to take the more ‘severe’ European porcelain as our type.

Let us consider what takes place during the firing of a paste of this latter description. After all the water, including that in combination in the kaolin, has been driven off, we have, as the temperature rises, an intimate mixture of two silicates, one of which, if heated alone, would be unaltered by any temperature at our command—this is the silicate of alumina derived from the kaolin; while the other is a fusible silicate of alumina and potash. There is also present a certain amount of free silica. There is reason to believe that at a certain point a chemical reaction takes place between these constituents, accompanied by a local rapid rise of temperature in the materials, the rise being due to this reaction. As a result there is a rearrangement of the molecules of the mass, although no complete fusion takes place. It is now, says M. Vernadsky (*Comptes Rendus*, 1890, p. 1377)—we are now following the account of his experiments—that the sub-crystalline rods—the baculites of which we have already spoken—are formed. M. Vernadsky claims to have separated these rods from the glassy base by means of hydrofluoric acid, in which the former were insoluble. He found them to consist of a very basic silicate of alumina, containing as much as 70 per cent. of that earth, while the glassy base was chiefly composed of silica in combination with the potash and with a small quantity of alumina. In their optical properties the crystals or baculites resemble the mineral known as sillimanite, a natural silicate of alumina.

This is all that scientific research has so far been able to tell us of the intimate constitution of porcelain; but as far as it goes, it is evidence in favour of our claim that we are dealing with a definite substance, *sui generis*, and not merely with a casual mixture of certain superior kinds of clay, something, as we have said, between glass and stoneware.

[5] For further details consult the authorities quoted in the *Handbook* of the Jermyn Street Collection, p. 5; for sections showing the relation of the beds of kaolin to the surrounding rock, see Brongniart’s *Traité des Arts Céramiques*, vol. i.

There are certain other elements that enter at times into the composition of porcelain—magnesia, which may have been added to the paste in the form either of steatite or magnesite; and lime, derived either from gypsum or chalk. These additions generally tend to increase the fusibility of the paste, especially when accompanied by an additional dose of silica; but as their presence is not essential we are not concerned with these substances here.

The glazes used for porcelain are as a rule distinguished by their comparative infusibility and by their containing no lead. The composition of these glazes follows more or less that of the paste that they cover, with such modifications, however, as to allow of a somewhat lower fusing-point: as in the case of the paste, there is a harder and more refractory, and a softer and more fusible, type. The harder glazes are composed essentially of felspar, with the addition in most cases of silica, kaolin, and powdered fragments of porcelain. At Sèvres, a natural rock, pegmatite, consisting chiefly of felspar, has been melted to form a glaze without further addition. Of late years, however, the introduction of a milder type of porcelain has necessitated the use of a more fusible glaze, containing a considerable quantity of lime, and it is a glaze of this latter type that has with few exceptions found favour in other districts where porcelain is made.

We have attempted in this chapter to give some idea of the nature of porcelain from a physical and chemical point of view, and in doing so have taken as our type the hard, refractory paste of Europe. When we come to describe the porcelain of the Chinese, we shall notice some important divergences from this type. We say nothing here of the soft-paste porcelains, seeing that so long as we confine ourselves to the question of chemical composition and physical properties, they lie entirely outside our definitions. It is only from the point of view of its history and of its artistic qualities that this group has any claim to the name of porcelain.

CHAPTER II
THE MATERIALS: MIXING, FASHIONING, AND FIRING

IT would be quite foreign to the scope and object of this book to attempt to describe in any detail the different processes that come into play in the manufacture of a piece of porcelain. There is the less cause for any such detailed treatment, inasmuch as the operations involved in the preparation of the paste and in the subsequent potting and firing do not essentially differ in the case of porcelain from those employed in the manufacture of other classes of pottery. The differences are rather those of degree—greater care is necessary in the selection of the materials, and these materials must be more finely ground and more intimately mixed. Again, the great heat required in the kilns necessitates, in the firing of porcelain, many precautions that are not called for in the case of earthenware or fayence. Without, however, some slight acquaintance with the processes of the manufacture, it would be impossible to avoid an amateurish and somewhat 'anecdotal' treatment of our subject. There are, indeed, many intimate features, many delicate shades of difference that distinguish the wares of various times and places, both in Europe and in the East, which can only be rationally explained by reference to the details of the manufacture.

At the present day there is only one district in Europe where true porcelain is manufactured on a large scale. This district lies on the western and south-western border of the central granitic plateau of France, especially in the Limousin and in Berry. Again at Sèvres, for the last hundred years and more, a succession of able chemists has carried on a series of experiments on the composition and preparation of porcelain. It is no wonder, then, if we find that the literature concerned with these practical departments is almost entirely French. One result of this is a greater richness in technical terms than with us. We find in France names for the various implements and processes of the potter's art, that are something better than the workshop terms of the local potter. Again, the little that has been written in England upon the technology of pottery has been concerned chiefly with earthenware of Staffordshire.[6]

As for the English soft-paste porcelain of the eighteenth century, there is a remarkable dearth of information both as to its composition and as to its manufacture. We know in fact in much greater detail how the great potteries at King-te-chen were carried on at the same period, thanks to the letters of the Père D'Entrecolles, and to the information collected in Dr. Bushell's great work, *Oriental Ceramic Art* (New York, 1899. I shall always quote from the text edition).

The following technical notes are based chiefly on the processes in use either at Sèvres or in the great factories of the Limoges district.[7] To begin with the Kaolin, the 'premier' element in the composition of porcelain. The greatest care is taken to procure a pure white clay which should approach as near as possible to the more or less theoretical mineral kaolinite, *i.e.* to a hydrous silicate of alumina. With this object the rough china-clay brought from the pit is thrown into a large tank of water and broken up with wooden spades; the milky liquid is now decanted into a second tank, leaving behind most of the quartz and the other stony particles. On its way the soup-like liquid passes through the meshes of a sieve—these may be formed either of brass wire or sometimes of finely woven silk. On this sieve all but the finest particles are retained. The greater part of the kaolin is

[6] It is to the scattered notices and essays of Mr. William Burton that we must go for information in this country. In his new work on *English Porcelain* he does not treat upon this side of the subject.

[7] The most complete work on the processes of manufacture is now Dubreuil's *La Porcelaine*, Paris, 1885. It forms part forty-two in Fremy's *Encyclopédie Chimique*. This volume brings up to date and replaces in some measure the great work of Alexandre Brongniart, the *Traité des Arts Céramiques* (two volumes, with a quarto volume of plates), Paris, 1844. M. Georges Vogt in *La Porcelaine*, Paris, 1893, gives valuable details of the processes employed at Sèvres.

deposited in this second tank, but a certain portion still remains suspended in the liquid, which is again decanted; the remaining kaolin then settles down in the third tank, yielding the finest clay. To dry this slimy mass, it is first forced by hydraulic pumps into canvas bags, and these bags are then pressed between fluted wooden trays, strongly clamped together. We have now got a white chalky mass which may contain as much as 98 per cent. of the hydrated silicate of alumina.

The other materials, the china-stone[8] and the quartz, have first to be reduced to the finest powder. To effect this they may, to begin with, be roasted to effect disintegration, then crushed in a stone-breaking machine, and finally passed through the grinding-pan in which they are ground fine between large blocks of chert which rotate upon a pavement of the same stone. The finely ground materials have now to be mixed in suitable proportions either by the old process of 'slop-blending,' where the different 'slops,' each of known specific gravity, are run in due proportion into the big 'blending ark,' or, as is now usual in the case of fine wares, by weighing out the materials in a dry state. On the relative amounts of the three elements, the china-clay, the china-stone, and the quartz, the nature of the porcelain after firing will depend. M. Vogt (*La Porcelaine*, Paris, 1893) gives a useful table showing the limits within which the materials may be varied. We may note that in the case of a normal china-stone or petuntse being used instead of felspar, very little additional quartz is required. These limits are: kaolin, 35 to 65 per cent.; felspar, 20 to 40 per cent.; and quartz, 15 to 25 per cent. The larger the percentage of the first material, the harder and more refractory will be the resultant porcelain.

This question of the composition of the paste has been the subject of many experiments lately at Sèvres. A somewhat animated discussion has raged around it. M. Vogt, who is the director of the technical department in the National Porcelain Works, is well qualified to speak on the subject. We shall not hesitate then to avail ourselves of the conclusions which he arrives at, the more so as they put tersely some important points of which we shall see the importance later on. I refer especially to the relations of the glazes and the coloured decorations to the subjacent paste.

These are, then, the results that M. Vogt arrives at:—

The two extreme types of porcelain, one with 65 per cent. of kaolin and the other with only 35 per cent., when taken from the kiln do not differ in appearance, though one has been subject to a temperature of 1500° C. to ensure vitrification and the other to only 1350° C. Their physical properties, however, are very different. The first, rich in alumina derived from the excess of kaolin, stands without injury variations of temperature, it suits well with a glaze made from felspar, a glaze hard enough to resist the point of a knife. These are excellent qualities for domestic use, but such porcelain does not lend itself well to artistic decoration. At the high temperature required in this case in the firing, the colours of the paste and of the glazes assume dull and tame hues, so as to offer little resource to the artist. In a word, in that part of the decoration that has to be subjected to the full heat of the kiln, the artist has command only of a restricted and relatively dull palette. Again, in the decoration of the muffle-stove the vitrifiable enamels do not become incorporated with the glaze on which they rest. If a decoration in opaque or translucent enamels is attempted, these enamels are apt to split off, carrying with them a part of the glaze. To sum up: the porcelain of which the hard paste of Sèvres, introduced by Brogniart, may be regarded as a type, though excellent for domestic use, is incapable of receiving a brilliant decoration.

Porcelain of the second type, more silicious and less aluminous, is fired at a lower temperature. In order to get a glaze sufficiently fusible to melt at such a temperature to a fine uniform surface, it is necessary to introduce a certain amount of lime into its composition; by this the glaze is rendered at the same time a little softer. But now the lower temperature of the fire will allow of a greater variety and greater brilliancy in the colours either combined with or used under the glaze. When we come to the muffle-fire we can employ enamels of the widest range of colour, yielding a brilliant decoration.

[8] The *cailloux* of the French. This material is often described as felspar, but I think that quartz can seldom be completely absent.

On the other hand, this type of porcelain offers less resistance than the other to the action of hard bodies and to rapid changes of temperature—enough resistance, however, so M. Vogt thinks, for all ordinary usages. It is to this type that the porcelain of China, and Japan, as well as the 'new porcelain' of Sèvres belongs. The latter comes nearer to the porcelain of the East than any other European ware. Finally, M. Vogt points out that most of the other European porcelains, those made in the Limoges district, in Germany and in Denmark, are of an intermediate type, and that they allow the use of either a felspathic or of a calcareous glaze (Vogt, *La Porcelaine*, pp. 144 *seq.*).[9]

To return to our raw materials, which we may now suppose to be weighed out in a dry state in the required proportions. These are once more thoroughly mixed with water to form the slip or *barbotine*, which is again passed through a fine sieve. To remove any particles of iron which may have come from the machinery or elsewhere, and which if allowed to remain would form unsightly stains on the finished ware, it is usual to pass the slip at this stage through a vessel in which a number of horse-shoe magnets are suspended. In some of the large French factories a more complicated machine is used for this purpose. The superfluous water has now to be removed either by evaporation or by pressure between canvas bags in the manner described above. The paste may then be passed through a pug-mill to render it uniform in consistency.

A curious question arises with regard to the prepared clay. There was formerly a widespread idea, which may contain an element of truth, that instead of handing the clay at once to the potter, it should be kept, under certain conditions, for a long space of time that it may undergo a process of 'aging' and fermentation. By the 'aging,' the working qualities, especially of a 'short' or non-plastic paste (such as that in use at Sèvres in the eighteenth century, in making the *pâte tendre*), were doubtless increased, the more so when the clay was at intervals subjected to fresh kneading and watering. With regard to the long periods for which the clay was kept by the Chinese, the most exaggerated statements were formerly made. Mr. William Burton is of opinion that there may be in some cases an evolution of carbonic acid and sulphuretted hydrogen when natural plastic clays are used, for these may contain both vegetable remains and small quantities of iron pyrites. But the change, he thinks, is chiefly a physical one, due to the settling down of the mass. Might there not also, I would suggest, be a change of a more intimate nature, due to the formation of gelatinous silica and perhaps also of fresh alkaline or other silicates, among these minutely comminuted particles of various materials now freshly brought together? We know very little of the conditions that give to natural clays their peculiar unctuous quality and their plasticity.

We come now to what has been called the 'shaping' of the clay, using that word as an equivalent to the French *façonnage* to include all the processes, throwing on the wheel, turning of the lathe, 'pressing' and 'casting,' by which the desired form is given to the vessel.

The Potter's Wheel, perhaps the most ancient of all mechanical contrivances, is still largely used in the shaping of porcelain, and that, too, in a simple form which differs little from that employed three or four thousand years ago in Egypt,[10] and perhaps for nearly as long a period in China. From an æsthetic standpoint, the wheel holds the same relation to the art of the potter as the brush does to that of the painter. It is perhaps a just cause of reproach against that branch of the ceramic art with which we are now concerned, that so comparatively little use is made of the potter's wheel. Not only in Europe, but for long ages in China also, the use of the wheel, for many classes of vessels, has been replaced by various processes of moulding. With us, but not in the East, a third process, that

[9] I should, however, be inclined to class not only much of the porcelain of Japan, but some of that made in Germany and in south-west France, rather in the 'severe' kaolinic than in the intermediary class of M. Vogt.

[10] We can, however, distinguish, in the tomb paintings of the Middle Empire, an earlier form without the lower table. This earlier type, moved by hand from the upper table, was that used by the Greeks at least as late as the sixth century B.C., and a similar primitive wheel is still used in India. On later Egyptian monuments of Ptolemaic time, the potter is seen moving the wheel by pressing his foot on a second lower table, as now at Sèvres and elsewhere. Both forms of wheel appear to have been used by the Italian potters of the Renaissance.

of 'casting' with liquid slip, is largely used. But when made either by casting or moulding, the hand of the potter is not seen in the shape of the finished vessel. By means of the wheel alone do we get the full expression of the peculiar qualities of a plastic material. This was recognised by the Greeks, when the potter who made the vase signed his name by the side of the painter who decorated it. This it is that gives a certain charm to the roughest earthenware which we may look for in vain in the most elaborately decorated specimen of either Chinese or European porcelain.

The clay as it comes from the filter-presses or from the drying-beds is subjected to a series of kneading processes to ensure uniformity of texture. The last of these is the 'slapping,' when the clay is made up into hollow balls, and thrown vigorously on to a board until all bubbles and irregularities of texture are removed.

The thrower's wheel is essentially a revolving vertical spindle, with a small round table at the top, beside which the thrower sits. The clay is handed to him in balls, and he throws it upon the whirling table between his knees. The table is put into motion either directly by the pressure of the workman's foot on a lower table, or by some arrangement of straps and pedals. If the movement is given by the potter himself, as is still the case at Sèvres, and to some extent in China, there is the advantage that a more delicate and intimate control of the speed is possible. The movement of the clay under the potter's hand is instinctively regulated by him. Every one has seen and marvelled at the wonderful process. The clay is first drawn up into a pillar, and then depressed into a flat cake, so that the circular arrangement of the particles may spread through the whole mass. The thrower then opens the hollow of the vessel with his thumbs, and proceeds to give it the desired shape, moistening his hands at intervals by dipping them into the slip. Small pieces are shaped between the thumb and first finger, either of one or of both hands. For larger pieces the whole hand and wrist is called into play, with the assistance, it may be, of a sponge. Still larger vessels are built up by piling on to the circular edge as it revolves strips of the clay. Delicacy of hand is of the greatest importance—the pressure applied and the movements of the fingers must be regulated by the nature of the clay, and especially by its greater or lesser plasticity. It is essential that the workman should not only press evenly and steadily on the clay as it rises, but that the speed of the rotation should have a definite relation to the rate at which he raises his hands. With a 'fat' or unctuous clay especially any irregularity of pressure will betray itself, and the marks will be more prominent after firing. This is the origin of the spiral ridges that we often see on the surface not only of common earthenware, but sometimes of high-class porcelain. To this cause are due the rings so characteristic of Plymouth porcelain; this 'wreathing' or '*vissage*' is sometimes seen on Chinese porcelain also.

When the thrower has finished his vessel, it is cut off from the table by a piece of thread or by a brass wire, and taken to the stoveroom to dry and harden. When sufficiently dry the vessel is placed on a lathe, and the turner shaves off all superfluous clay. The finer mouldings (using the word here in its architectural sense) may also be given at this stage, and sometimes the surface is shaped by a 'profile' of steel (it may be a piece from the blade of an old saw), which cuts the surface down to the desired shape. The shavings are carefully preserved and returned to the slip-house, to be blended with the new clay, the working qualities of which are thereby improved.

There are certain parts, especially handles, spouts, and projecting ornaments, which must in all cases be separately moulded. The foot also, in the case of large vases, is separately prepared and subsequently attached. These parts are made in plaster moulds by the 'handler,' whose duty it now is to fix them to the vase. Carefully marking the exact place, he spreads on it a thin layer of slip with a spatula, and then presses home the handle or other appendage. Should, however, the two surfaces be dry and absorbent, it may be necessary to add some gum to the slip thus employed. A similar process, but one requiring greater care and skill, is that of fixing together the separate pieces of large vases and figures. This is done in the way we have already described in the case of the handles and spouts —that is by applying a coating of slip to the parts to be joined.

It is at this stage that any decorations in relief that may be required are applied to the surface. These are often made in flat moulds, and to fix them it is enough to run a little water from a camel's hair pencil behind the ornament after adjusting it to its proper place. These processes of fitting on of appendages and ornaments are included by the French under the term *garniture*.

Moulding and Pressing.—It is evident that only vessels of a cylindrical or conical form, or, more exactly, such as have a circular section when divided horizontally, can be formed on the wheel. To produce any other form, the vessel must be either shaped directly by the hand or made in some kind of mould. The use of moulds for pottery is as old, if not older than that of the wheel. It was in this way that the *Ushabti* figures of the old Egyptians were made, and many of these date back to the Early Empire. So in China, the further back we go, the more the use of moulds seems to have prevailed. I take from the excellent article on the manufacture of pottery in the *Penny Cyclopædia* the following account of the process in use in England at the beginning of the last century:—

'The mould is made in two parts, and each is separately filled by laying in a cake of clay which has been beaten out to the proper thickness on a wet plaster-block; it is pressed into the mould by repeated blows from a ball of wet sponge, then squeezed into all the angular parts and smoothed with sponge, wet leather, and horn. When both sides of the moulds are thus lined with clay, they are joined together, and the man lays a roll of clay along the inside of the joining, which he works down until the whole is smooth and solid.' The mould is then carried into a stoveroom, and the plaster here absorbs the moisture so as to release the clay. The contents are carefully taken out, and the empty mould returned to the stove previous to being filled again. The seam that remains on the outside of vessels after fitting the two parts together[11] is removed by scraping and burnishing with wet horn; the handles and other appendages are then attached.

This is the process that is called 'hollow-ware pressing' or 'squeezing.' In 'flat-ware pressing' the mould is used to give the shape to the inside of the vessel only. The mould is placed on the extremity of the 'whirler,' a vertical revolving spindle provided with a circular table, similar to that of the thrower's wheel. The plate-maker takes a cake of clay, which he has previously flattened out with his 'batter,' places it on the mould, and presses down with his hand. The upper surface of the cake of clay (what will ultimately be the bottom of the plate) is now shaped by an earthenware 'profile.' The mould is now taken off the whirler and at once replaced by another. Flat-ware, especially when greater finish is required, is also made in a double mould, and the clay may then be first thrown on the wheel so as to approximate to the shape required before being placed in the mould.

Processes very similar to the hollow and flat-ware pressing are largely used by the Chinese. Dr. Bushell has unearthed a passage from a technical work, written in the time of the Chou dynasty, more than two thousand years ago, in which a distinction is made between the ordinary potters who worked with the wheel, and the moulders who made oblong bowls and sacrificial dishes. In a somewhat later work (19-90 A.D.) the writer notes both the advantage resulting from regularity of size, and the obstacles arising from the shrinkage of the parts in firing, when vessels are made in moulds.[12]

Casting.—There is yet another process which is largely resorted to in European works, but which appears to be unknown to the Chinese. It depends upon the rapidity with which dry plaster of Paris will absorb the water from a slip of creamy consistency, without allowing any of the solid particles to pass along with the water absorbed. The slip-mixture is poured into the plaster mould, which at once absorbs the water, leaving a uniform deposit upon the surface of the mould. After pouring or otherwise drawing off the water, a second and thicker slip may be added so as to form a second layer. The paste of the porcelain so prepared is likely to be of a lighter and more porous consistency than when made by throwing or pressing. This process was used in the eighteenth century

[11] This seam is often visible on vases of old Chinese porcelain, and may be taken as a sign that the object has been moulded.

[12] Porcelain in China followed, as we shall see, in the wake of the more early developed arts of the bronze-caster and the jade-carver. Hence the prevalence in the early wares of shapes unsuitable to the wheel.

at Derby, and doubtless elsewhere, and it was preferred to moulding for making statuettes. Some account of it is given by Haslem, a good practical authority, in his *Old Derby China*. For small objects, 'casting' has long been employed in France, and more lately Ebelmen and Regnault have so improved the process, that vessels of all shapes and dimensions are made by it. This has been rendered possible by the introduction of compressed air into the interior of the vessel, by which means the paste is kept in position until it is sufficiently dry to support itself. A still better way of doing this is to exhaust the air *on the outside*, by placing the mould in an air-pump; the upper part can then be left open, and the whole operation is under the eye of the workman. M. Vogt (*La Porcelaine*, pp. 157 *seq.*) laments that in France the increased use of these mechanical processes had so reduced the demand for skilful potters, that the race is nearly extinct.

Firing and Furnaces.—So far in our treatment of the operations involved in the manufacture of porcelain, the same general description has been applicable, with trifling exceptions, to the processes in use both in Europe and in the far East, and to soft as well as to hard paste. But now that we have to describe the firing of the ware, a division into three classes is necessary:—

1st. The Chinese system. This is the simplest plan. The glaze is applied at once to the air-dried ware, which is then subjected to but one firing—that of the '*grand feu*.'

2nd. The French system for hard paste. The unglazed vessel is exposed to a heat varying from dull to full red, generally in the dome over the main body of the furnace. It is then glazed, and again fired to the full point required by the paste. This is essentially a French process, and the preliminary fire is known as the *feu dégourdi*.

3rd. The English system used for bone pastes. In this case it is the first firing that is the most severe. The 'biscuit oven,' therefore, in which this is effected, must not be confused with the *feu dégourdi* just mentioned. After dipping, the ware is heated again in the 'glozing' or glazing oven, but only to a temperature sufficient to melt the glaze.

In the case of ware decorated with enamel colours over the glaze, there will be required in all these cases one or more additional firings at comparatively low temperatures in the muffle-stove.

The furnaces, ovens, or kilns in which porcelain is fired are always of the reverberatory type; that is to say, the fuel is burned in a separate chamber or fireplace, and the products of combustion pass over or among the ware that is being fired. Such furnaces differ on the one hand from the arrangement in a blast furnace, or that often used in the burning of bricks, where the fuel is mixed with the material to be heated, and on the other hand from the muffle-stove, where the object exposed to the heat is protected from the direct flame by the box of fireclay or iron in which it is placed.

Kilns of many shapes and sizes have been used for firing porcelain, but they may most of them be included in one or the other of the following broad classes.

1st. The old bee-hive ovens of China, the use of which appears to have been abandoned in that country by the end of the seventeenth century. These ovens were generally small, in some cases only holding one vase. A row of them may be heated from one fireplace, and they are then built on a rising slope. This type has survived to the present day in Japan.

2nd. The oblong horizontal furnaces, often of considerable dimensions, used during the present dynasty in China. They resemble in section the ordinary type of reverberatory furnace found in metallurgical works. A very similar form was long employed at Meissen.

3rd. The large conical furnaces, now in general use in the porcelain factories of Europe. They may be heated by either direct or by reversed flame.[13]

In China the fuel is generally pinewood, in billets of uniform size. In many European kilns wood is still used: birchwood, cut in lengths of fifteen to twenty inches, is the only fuel used at the present day at Sèvres. In England, however, the difficulties attendant on the use of coal appear to have been overcome.

[13] I think that this is a more practical division than the one made by M. Vogt and adopted by Dr. Bushell.

The reader will find in the third volume of Brongniart's great work (*Traité des Arts Céramiques*, Paris, 1877) several plates giving plans and sections of all these types of furnaces. From a careful examination of these engravings more is to be learned than from any amount of verbal description. A thorough grasp of the process of firing is of the greatest assistance in understanding the problems and difficulties that arise in the manufacture of porcelain, and we shall have to return to the subject when we come to treat of the several wares.

Whatever differences there may be in the shape of the furnaces, when it comes to filling the interior with the ware to be baked, there is one precaution which has been adopted in nearly every country.[14] The ware must be protected from the direct heat of the flame by means of a case of fireclay in which it is placed. These are the seggars (French *cassettes*; the process of filling and arranging them is called *encastage*), to the preparation of which so important a department has to be set apart in all porcelain works, and whose manufacture adds so much to the working expenses.

The seggar proper is a cylindrical pan of fireclay, in shape and size like a hatbox. They are piled, in the furnace, one over the other, and these piles or 'bungs' are arranged in the furnace so as to allow a free circulation of the hot gases between them, but otherwise they are packed as closely together as possible. These seggars may be used several times over. When broken, the fragments are ground up and mixed with fresh fireclay or *argile-plastique* to form new cases—without this addition the clay would be too plastic or 'fat' for the purpose. The greatest precautions are taken in the packing of the seggars in the furnace. The giving way of one pile from any inaccuracy in the arrangement may destroy the contents of the whole oven. So again infinite care must be taken in the arrangement and support of the objects in each seggar. The bottom is covered with ground flint or other infusible material, and the vessel is supported, when necessary, by various forms of struts, props, or crow-claws, which sometimes leave their mark on the base or side of the finished object. In spite of these precautions, a large quantity of defective pieces or 'wasters' are produced in all works, and these are usually cast aside. The finding of such fragments in after days is sometimes the only proof we have that porcelain or pottery has formerly been made at the spot. But the proof is final, for defective pieces and 'crow-claws' are not objects likely to have been imported from a distance. Again, the indelible marks left on the porcelain, either on the edge which rested directly on the seggar or at the points where the object was supported by the crow-claws, often give valuable hints as to the *provenance* of the piece in question.[15] In the case of valuable wares these rough edges and marks are removed as far as possible by grinding on a small wheel, and then polishing the surface with pumice or with putty.

[14] An important exception is to be noted in the case of the firing of large vases in China.

[15] A good instance of the first case is the finding of crow-claws in the rubbish-heaps of Fostât or Old Cairo. As to the method of support indicating the place of origin, see what is said below about the celadon ware of Siam.

CHAPTER III
GLAZES

BEFORE attacking the somewhat complicated subject of the nature and composition of glazes, it will be well to take up again the thread of the mechanical processes that are involved in the making of a piece of porcelain.

The materials that enter into the glaze are reduced to the finest powder in mills similar to those in which the china-stone and flint are ground for the preparation of the paste. If any substance soluble in water, such as borax or salts of the alkalis, enter into the composition of the glaze, these must be first partially fused in combination with the other materials to form a *frit*, a kind of imperfect glass. These frits, which enter so largely into the composition of soft-paste porcelain, are formed with the object of bringing the soluble constituents into an insoluble form before mixing with water to form the slip. There are indeed other practical reasons that render a preliminary partial fusion desirable.

The finely ground elements of the glaze, mixed in due proportion, are worked up with water to form a creamlike slip into which the vessel to be glazed is now dipped. In China, in many cases, the glaze-slip is blown upon the surface in the form of a spray. This is done by means of a bamboo tube, covered at one end by a piece of silk gauze, through which the liquid is projected by the breath of the operator (French, *insufflation*); in other cases the glaze may be painted on with a brush. In China, as we have mentioned, the glaze-slip is generally applied to the raw surface of the thoroughly dried but unbaked ware, but in other countries there is, almost without exception, a preliminary firing of greater or less degree to produce a biscuit.

We shall restrict the use of the word glaze to the vitreous coating applied directly to the surface of the raw paste or of the biscuit to enhance the decorative effect of the ware, and with the more prosaic object of allowing the surface to be easily kept clean. In the case of porcelain this coating is always more or less transparent.[16] There is here no necessity for concealing the natural white colour of the paste. In the case of many kinds of pottery, however, as in the 'enamelled fayence' of Delft and Italy, the glaze is rendered opaque by the addition of oxide of tin, so that the ill-favoured ground is concealed by a white shiny surface which may be made to resemble closely the natural surface of porcelain. A glaze of this kind is often called an enamel, but as we are not concerned with such an expedient we shall confine the use of that word to the various forms in which a vitreous decoration, whether translucent or opaque, is *superimposed upon the glaze* and fused into it, more or less thoroughly, by a subsequent firing in a muffle furnace.

The English word 'glaze' is only another form of the word 'glass,' and we may say at once that, in composition at least, there is often little difference between the two substances. The French word for 'glaze' is *couverte* or *vernis*; the last term applies well to the thin skin of glaze found on Greek pottery. The Chinese have several expressions, but it is a curious fact that the characters with which most of these terms are written contain the radical for 'oil,' and indeed the word 'oil' itself is often used in the sense of 'glaze.'

Mr. Rix puts it well when he says that the glaze is to the enameller of porcelain what his canvas is to the painter; while in the case of a decoration '*sous couverte*,' the glaze corresponds to the varnish which, while protecting his work, gives brilliancy to the colouring (*Journal of Society of Arts*, vol. xli.). It is, moreover, the vehicle by which the design is harmonised and rendered mellow. The effect is produced at once and endures practically for all time.

The hardness and fusibility of glazes differ widely, and they are conditioned by the nature of the wares that they cover. It is evident that there must be a close relation between the fusing-

[16] There is only one exception of any importance—the porcelain of Chantilly, much of which has an opaque stanniferous glaze.

points of paste and glaze, and that the latter should be the more fusible of the two. The difference of melting-point should, however, not be too great. The melted glaze should rather, by penetrating into the already softened paste or by a chemical action upon its surface, form a more or less uniform mass with it. In cooling, the contraction of the glaze should follow that of the subjacent paste. This is a most important point; any discordance may lead to splitting, cracking, and 'crazing.'

The beauty of the surface of porcelain depends on the fact that the glaze has become intimately united with the paste during the long exposure of both to a high temperature. We should not be conscious, in regarding a fine specimen of porcelain, of a greater or less thickness of glass covering an opaque substance; we should rather see in it the polished surface of ivory or of some precious marble.

It would seem that it was the beauty of the glassy surface, enhancing the brilliancy of the colouring, rather than any practical advantage connected with its use, that first led to the application of glaze to pottery. The turquoise and green glazes of the Egyptians (the colour is derived from a silicate of copper along with soda and sometimes lime) were known to the men of the Early Empire. They were applied to a fritlike mass of sand held together by silicate of soda, to which the name of porcelain has sometimes been very wrongly given. Objects of steatite, of slate, and even of rock crystal were sometimes covered with a coloured glaze of this kind, but it was never applied to the clay vessels in daily use. These were made, then as now, from the unctuous clay of the Nile bank. For this restriction there was a very good reason, namely that a glaze of this nature, composed chiefly of alkaline silicates, will not adhere to a base of ordinary clay. It was not until Ptolemaic and Roman times that, by the discovery or adoption of a glaze containing lead, the ancients were enabled to glaze their pottery. So in Assyria, the employment of glazes was almost confined to the decoration of the surface of brickwork, the bricks being of a loose and somewhat sandy texture.[17]

In these glazes, and indeed in much earlier examples from Babylonia, both tin and lead have been found. The respective virtues of the silicates of these metals were doubtless appreciated, that of tin to form a white opaque enamel hiding the material below, and that of lead to enable the glaze into which it enters to adhere to a paste formed of a plastic clay.

With the Chinese the aim was rather æsthetic than practical. They sought by means of the marvellous glazes that cover their ancient porcelain to imitate the surface of natural stones; their early celadons were in a measure intended to take the place of the precious green jade, so highly esteemed by them.

At the time when the manufacture of porcelain was first introduced from China there were (apart from the salt-glazed stoneware, which lies quite outside our inquiry) three classes of glaze in general use either in Europe or in the nearer East:—

1. Glazes consisting essentially of alkaline silicates without either lead or tin. Such glazes could only be applied to a fritty silicious base, and in India and Persia their employment seems to have been a survival from Egyptian and Assyrian times.[18]

2. Opaque enamel glazes, the opacity being due to the presence of tin; a considerable amount of lead also is generally found in these glazes. We are not concerned here with the obscure origin of this group, but in the sixteenth century this enamelled fayence was in general use for the better class of table-ware. It includes the Italian majolica, the French fayence of Nevers and Rouen, and above all the earthenware of Delft.

3. The oily-looking lead glazes with which the common earthenwares were covered. These were essentially the glazes of the Middle Ages in Europe, and their employment could probably be traced back to the lead-glazed ware sparingly used by the Romans. We have already noticed the use of a similar glaze in Egypt as far back probably as Ptolemaic times.

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[17] So we can infer from the magnificent wall decoration of the Achæmenian period brought home from Susa by M. Dieulafoi.

[18] A glaze of this nature was in the Saracenic East applied to a layer of fine white slip, which itself formed a coating on the coarse paste. Such a combination, often very difficult to distinguish from a tin enamel, we find on the wall-tiles of Persia and Damascus.

There were practical objections to all these glazes. It is true that at Delft, by the use of the tin enamel, a ware could be turned out closely resembling, in external aspect, the blue and white porcelain of China, but the enamel was soft and would in time chip off at the edges, showing the dark earthy clay beneath. On the other hand, the alkaline glazes of the East were not much known in Europe; they can only be used upon a very tender and treacherous base. In India and Persia, however, a ware thus glazed still competes with the hard porcelain of the Far East. In spite of the great objections to the glazes of our third class, those containing lead—objections arising from their softness and from the danger of poisoning to those employed in their manufacture—their use has tended rather to increase. Not only is lead the principal constituent of the glazes still universally used for common pottery, but it forms an important element in the glaze of our finer earthenwares as well as in that of those bone pastes which rank with us as porcelain.

The glaze which had been brought to perfection by the Chinese at an early period differs from all those yet mentioned by its hardness, its high fusing-point, and in its chemical composition. Speaking generally, the glaze of porcelain differs in composition from the paste which it covers only sufficiently to allow of its becoming completely liquid at the extreme heat of the furnace; and just as the paste of Chinese porcelain has a wider limit of variability than that made in Europe, but is on the whole of a 'milder' type than the latter, so we find that while the glazes of the Chinese are as a whole less refractory and not quite so hard, there is still a wide range of variation in these qualities.

If, then, we theoretically regard porcelain as a compound of a silicate of alumina with an alkaline silicate of the same base, we may say that the glaze of porcelain is formed by the latter body alone, that it is, in fact, merely a fused felspar. But as in the case of the paste, so in the glaze there is generally present an excess of silica, derived from the quartz contained in the petuntse or pegmatite, and this silica enters into combination with some other bases which are present in the constituents of the glaze, thereby increasing its fusibility and modifying the contraction in cooling. The most important of these additional bases is lime, so that the more fusible type may be called a calcareous, as opposed to a more refractory or purely felspathic glaze. As much as 21 per cent. of lime has been found in some Chinese glazes, the amount of alumina being proportionately reduced.

There is more or less lime in the glaze of most kinds of European hard porcelain, but the exceptionally hard and refractory paste made at Sèvres since the time of Brongniart is covered by a glaze of corresponding hardness from which that earth is absent. This hard paste has, however, of late been replaced in part by one of a milder type, and with this latter a calcareous glaze has been adopted even at Sèvres, the object of the change being, as we have said, to allow of a more brilliant decoration.

There is a perceptible difference in the aspect of these two types of glazes after firing. The hard, non-calcareous glaze has a slightly milky look. The softer calcareous type is more brilliant, and approaches in transparence and limpidity to the lead glazes of soft porcelain. A glaze of this last kind was used at Sèvres for a few years after the first introduction of the hard paste, and perhaps also at Dresden in quite early days.

The principal objection to a hard refractory glaze, such as that so long in use at Sèvres, arises from the difficulty of properly incorporating the enamel colours with its body. The restriction of the number of pigments that can be employed, both under and on the surface of the glaze, in consequence of the high temperature at which the latter melts, is another drawback. The dulness, the 'painted on' look of so much of the decoration on European hard paste porcelain, is in great measure a consequence of the employment of a glaze that is only softened at a high temperature. As an example of a medium type of glaze we give the composition of that used at Berlin in 1836. This consisted of kaolin, 31 per cent.; quartz, 43 per cent.; gypsum, 14 per cent.; and ground porcelain, 12 per cent. A glaze long in use at Dresden is of a very similar character. Felspar, it will be seen, does not enter into its composition, and such a glaze can contain but little potash or soda. With this we may contrast the hard glaze of Sèvres, composed simply of ground pegmatite, a rock consisting mainly of felspar.

This glaze yields on analysis 74 per cent. of silica, 17 per cent. of alumina, and as much as 8 per cent. of potash.

The glaze on Chinese porcelain is prepared by mixing certain special varieties of petuntse with an impure lime, prepared by burning limestone with dry fern as fuel. It contains, as we have seen, from 15 to 21 per cent. of lime, 5 to 6 per cent. of alkalis, 11 per cent. of alumina, and 66 per cent. of silica.

We give these examples to illustrate the principal types of glazes used for hard paste porcelain. It will be noticed that the constituents are drawn from widely different sources.

The glazes of soft paste porcelain always contain a large amount both of lead and of potash or soda, so that they approximate in composition to a flint glass. The alkalis, generally introduced as carbonates, necessitate a previous fritting of part at least of the materials. Boracic acid plays an important part in the glaze of most modern English wares: it is generally introduced in the form of borate of soda or borax. This acid replaces in part the silica, just as in the paste the glassy materials are replaced by bone-earth.

CHAPTER IV
DECORATION BY MEANS OF COLOUR

IF we were treating the subject purely from a practical point of view, with the glazing and firing of a piece of porcelain the manufacture might be held to be terminated. This would be strictly true, for instance, of the white porcelain of Berlin, so largely used in the chemical laboratory; a great deal, too, of the china in domestic use receives no decoration of any kind. But for us there remains still to examine the element of colour and the way in which it is applied to the decoration of porcelain.

This is effected in three different ways: by the employment of coloured glazes; by painting on the surface of the paste before the glaze is applied (this is the decoration *sous couverte*); and finally by coloured enamels applied to the surface of the glaze. These methods may be combined, but as this is rarely the case, such a division forms the basis of a convenient classification, more especially for the wares of China and Japan.

In the case of both the paste and of the glaze, we have been dealing with a restricted group of elements, with alumina, lime, potash and soda; and apart from impurities unintentionally introduced, all the combinations of these bodies are colourless. We have now to consider the effect of introducing certain of the heavy metallic bases which combine with the excess of silica to form coloured silicates.

The metals that give to Oriental porcelain its brilliant hues are few in number. Indeed, in all lands and at all times, iron, copper, cobalt, and manganese have been the principal sources of colour in the decoration not only of porcelain, but of most other kinds of pottery. As equal to these four metals in importance, but not strictly to be classed as colouring materials, we may place tin, the source of most opaque whites, and lead, which is the main fluxing element for our enamels. Next in importance to these metals come antimony, long known to the Chinese as a source of yellow, and finally, but this last only since the beginning of the eighteenth century, gold, as the source of a red pigment.[19] This exhausts the list, not only for the Far East, but for all the pottery of Europe up to the end of the eighteenth century.

It was in a period of artistic decline that the advance of chemical knowledge led to the introduction of other colours, derived both from new metallic bases and from fresh combinations of those already known. By far the most important of these new colours are those derived from the salts of chromium, but uranium and other rare metals have also been called into use. As with the sister art of painting, the beauty and harmony of the effects produced have not kept pace with the enlargement of the palette—the result was rather to accentuate the decline that had already set in from other causes.

There are two metals, iron and copper, that have always been of pre-eminent importance as sources of colour. Each of them forms two series of combinations differing entirely in hue, so that were we confined to the use of these two metals, our palette would still be a fairly complete one.

The protoxide of copper, especially when a certain amount of lime and of soda is present, forms a series of beautiful blue and green silicates. When the proportion of oxygen is decreased, as happens when the surface of the ware is exposed in the kiln to a reducing flame, a suboxide of copper is formed, which gives a deep and more or less opaque red hue to the glaze. So in the case of iron, the so-called sesqui-oxide is perhaps the most abundant source of colouring matter in the mineral kingdom: the colours produced by it range from pale yellow to orange, brown, and full red. When, however, the iron is present as a protoxide, the colour given to the glaze is entirely altered; it ranges from a pale sea-green to a deep olive.

[19] Metallic gold has, of course, been applied to the decoration of porcelain in all countries.

The remaining two elements that have long played an important part in the decoration of pottery are cobalt and manganese. These metals, in the form of silicates, yield the well-known series of blues and purples. One important source of the famous underglaze blue of China and Japan is a black mineral known to us as wad, which occurs in earthy to stony concretions. This wad contains oxides of both cobalt and manganese, and the quality of the blue obtained from it depends in great measure upon the proportion in which the two metals occur.

The employment of antimony is comparatively rare, but, generally in combination with iron, it is an important source of yellow. In spite of the volatile nature of most of its salts, in the presence of silica this metal is able to withstand a high temperature.

But before considering the application of colour to the glaze, we must mention briefly a method of decoration which was in great favour at Sèvres some years ago—I mean the application of colour to the paste itself. This was done long ago by Wedgwood, sometimes to the whole mass of the paste, as was the case with his jasper ware, which some authorities class as a true porcelain. At Sèvres these coloured pastes have been generally applied to the surface only, in thin layers, or even as mere coats of paint. When laid on in successive coats, as in the so-called *pâte-sur-pâte*, the amount of colouring matter need not be large, from 2 to 5 per cent. When larger proportions of coloured oxides are mixed with the *pâte*, and this is painted on with a brush, the process differs little from the ordinary decoration under the glaze, into which it indeed may be said to pass. Coloured pastes of this description have never been employed by the Chinese, and it is not possible to obtain much brilliancy or decorative effect by their use. They are, indeed, foreign to the nature of porcelain, sacrificing the brilliant white ground which should be the basis of all decorative schemes.

When the colouring matter is subjacent to the glaze it must be of a nature to withstand the full heat of the subsequent firing; we are restricted therefore to colours '*à grand feu*.' This practically confines us to cobalt and to certain combinations of iron and copper, as far as the 'old palette' is concerned. At Sèvres and elsewhere other metals have been made use of whose silicates withstand the extreme temperature of the kiln. By the use of chromium we have command of many shades of green. If to an oxide of tin we add a minute quantity of the sesqui-oxide of chromium, we can obtain, in the presence of lime, many shades from rose to purple; and a mixture of cobalt and chromium produces a fine black. There is, however, as yet no satisfactory yellow pigment known that will withstand the *grand feu*. At the best we can get a straw colour from certain ores of tungsten and titanium, and from uranium a yellow deeper in tint but uncertain in application.

The majority of the colours we have mentioned require a more or less oxidising flame for their full development. There are, however, two most important groups of coloured glazes, long the monopoly of the Chinese, but now successfully imitated in France and elsewhere, which require, for a term at least, to be subjected to a reducing flame.

The first of these glazes is the well-known Celadon, using that term in its proper and restricted sense, for certain shades of greyish green. The celadon of the Chinese is produced by the presence of a small quantity, about two per cent., of protoxide of iron in the glaze. An oxidising flame would change this protoxide to the yellow sesqui-oxide. We may note that a celadon of good tint can only be produced when a considerable quantity of lime is present in the glaze.

The other group, depending also upon a reducing flame, is constituted by the famous Sang de bœuf and Flambé glazes.

The colour of the first is given by the red sub-oxide of copper, chiefly suspended in the glaze. In the case of the *flambé* or 'transmutation' glazes, the strange caprices of colour have their origin, in part at least, in the contrast of the red sub-oxide and the green silicate of copper. In the case of both these glazes everything depends on the regulation of the draught of the furnace in which they are fired. The French have lately been at great pains to master the difficulties attendant upon the development of the effects sought after, and some success has been attained not only on a porcelain ground as at Sèvres, but these glazes have also been applied to fayence at the Golfe St. Juan and

elsewhere. It has been proved by some experiments made at Sèvres, that in the firing, the critical period, during which so much depends upon the regulation of the draught, is *just before* the melting of the glaze. Once melted the glaze not only forms an impervious cover which prevents the smoky flame from discolouring the paste below, but the glaze itself is no longer sensitive to the action of the gases which surround it. It is therefore only during a short period preceding the moment when the glaze begins to melt, that it is necessary to promote a smoky and reducing flame. This is a point of considerable practical importance.[20]

The application of the Decoration under the Glaze is essentially a Chinese method. To it we owe the important family of 'blue and white' ware. The superiority of the Chinese in the management of the blue colour has been attributed to various causes. The result is no doubt influenced not only by the constitution of both paste and glaze, but also by the fact that the colour is painted upon the *raw* paste.

An important factor also is the care exercised by the Chinese in the selection and preparation of the blue pigment, by which not only the desired intensity but the richness of hue is secured. The quality of the blue depends in great measure upon the presence of a small quantity of manganese in the cobalt ore employed.

The only other colour that the Chinese have succeeded in using under the glaze is the red derived from the sub-oxide of copper. The full development of this colour has for long been a lost art, but a less brilliant red from this source, often little better than a buff colour, is sometimes found in later examples combined with the blue.

In the application of colours under the glaze there is one difficulty that the Chinese have surmounted even in their commonest ware, and this is the tendency of the cobalt blue to dissolve and 'run' in the glaze, giving to the design a blurred and indistinct appearance. It would seem that the sharpness of outline depends upon the consistency of the glaze at the moment when it first melts. At that point the glaze should be viscous and not inclined to flow, and this is what occurs in the case of the highly calcareous glazes of the Chinese.

Before passing to the enamel colours, we must say something of a class of glazes which may be looked upon as to some extent of an intermediate character. These are the glazes associated with the 'San tsai,' the 'three colours' first used in combination by the Chinese.

These coloured glazes were applied, not, as is usually the case in China, to the raw paste, but they were, it would seem, painted on the surface after a preliminary firing. Being applied with a brush, the whole surface of the biscuit was not necessarily covered, and glazes of all these colours could be used upon the same piece of porcelain. Glazes of this class were rendered more fusible by the addition of a certain quantity of lead, and on this ground, and still more in their historical relation, as we shall see later on, these 'painted glazes' may be considered as a link connecting the old refractory glazes of the monochrome and 'blue and white' wares on the one hand, with the fusible enamels which were at a later time *superimposed* upon the glaze on the other.

The three colours which are applied in this way by the Chinese are: (1) A turquoise blue derived from copper with the addition of some soda or potash. (2) The manganese purple, often described as aubergine. (3) A yellow prepared from an iron ore containing some amount of antimony. None of these colours would stand the full heat of the furnace, and for a reason which will be explained further on, they are known as the colours of the *demi grand feu*.[21]

Coloured Enamels. We have now to describe

[20] The colour of the ruby glass in our thirteenth century windows has a very similar origin. In this case the art was lost and only in a measure recovered at a later period. As in the case of the Chinese glaze, the point was to seize the moment when the copper was first reduced and, in a minute state of division, was suspended in floccular masses in the glass.

[21] With these colours a dark blue is sometimes associated. Is this derived like the turquoise from copper? It is a curious fact that we have here exactly the same range of colours that we find in the little glass bottles of Phœnician or Egyptian origin, with zig-zag patterns (1500-400 B.C.).

PLATE II. CHINESE MING PORCELAIN, BLACK GROUND

the decoration that is applied to the surface of the glaze. In these coloured enamels the colouring matter is dissolved in a flux which contains a large quantity of lead. The comparatively gentle heat at which such enamels fuse allows of the use of a much larger palette than is available for the decoration under the glaze.

It is well to point out at the outset the marked distinction in composition and in appearance between the brilliant enamels of the Chinese and the dull tints of the 'porcelain colours' found in the

hard pastes of Meissen and Sèvres. To make clear the cause of this difference it will be necessary to enter into some little detail.

The colouring matter in the European enamels may amount to as much as a third part of the total amount of the flux with which they are incorporated. As there is not enough of this flux to dissolve the whole of the oxides, the enamel remains dull and opaque after firing. The flux, in fact, is only used as a vehicle to attach the colour to the surface of the porcelain. The effect in consequence is inferior in brilliancy to that obtained by the Chinese with their transparent enamels in which the metallic oxides, present in much smaller quantity, are thoroughly dissolved to form a glass. There is, unfortunately, a practical obstacle to the application of these glassy enamels to the hard pastes and glazes of Europe. It is impossible to ensure their firm adhesion to the subjacent glaze. The Chinese, however, do not appear to find any difficulty in effecting this. The following explanation has been given to account for the difference of behaviour:—the tendency of the enamel to split off in cooling, as has been proved by experiment, arises from the small amount of contraction at that time of the highly kaolinic paste, compared with that of the superimposed glassy enamel. The more silicious paste used by the Chinese contracts, on the contrary, at the same rate approximately as the enamels that it carries, and these enamels may therefore be laid on in sufficient thickness without any risk of their subsequently splitting off.[22] To appreciate the difference in the decorative value of these two classes of enamels it is only necessary to compare the brilliant effect, say, of a piece of Chinese egg-shell of the time of Kien-lung with the tame surface of a contemporary Meissen plate, elaborately painted with landscapes or flowers.

The glassy enamels used by the Chinese resemble the pastes used for artificial jewellery. They are essentially silicates of lead and an alkali. The composition of the flux has to be modified to ensure the full development of the colour of the different metallic oxides which are either made up with it or added subsequently. But in a general way we may say that the colourless fluxes which form the basis of the coloured enamels are prepared by melting in a crucible a mixture of pure quartz sand and red lead, and adding more or less alkali. In certain cases the lead predominates, as when it is proposed to make an emerald green enamel by means of copper, or when the flux is to serve as a basis for the ruby colour given by a minute quantity of gold. On the other hand, if copper be added to a flux containing an excess of either soda or potash, we obtain a turquoise blue. A fine purple, again, can only be obtained from manganese with an alkaline flux; if too much lead is present only a brown tint is obtainable.

To melt these enamels and to ensure their adherence to the subjacent glaze another firing at a gentler temperature is necessary; indeed in many cases more than one such firing has to be resorted to. The comparatively high temperature required to develop the colour of one enamel may be sufficient to decompose or otherwise damage another part of the decoration. The lowest temperature of all is that of the muffle-fire in which the gilding is fixed. This is therefore the last decoration to be added.

The oven in which these enamels are melted on to the surface of the already glazed porcelain is called a muffle. The ware in this case is protected from the direct action of the flame by the closed rectangular box of fireclay in which it is placed, like bread in a baker's oven. The muffle is placed over the fireplace of a rectangular furnace, and the flame plays round the sides in such a way as to ensure the uniform distribution of the heat. For the sake of greater cleanliness and the avoidance of dust, the pieces to be fired are placed upon tiles of porcelain rather than upon biscuit or fireclay supports. The temperature may vary from a dull to a full red heat (600° to 1000°C.), and the firing lasts from four to twelve hours.

We have already mentioned incidentally many of the so-called 'muffle-colours' or enamels. Those used in China were carefully studied some years ago by Ebelmen and Salvétat at Sèvres. It

[22] See Vogt, *La Porcelaine*, p. 219. The problem is really more complicated. For simplicity's sake we have ignored the changes that take place in the glaze that lies between the enamels and the paste.

would appear that the opaque white of the Chinese is obtained from arsenic—the merits of the use of tin for this purpose appear to be unknown to them. The blacks are made from the already mentioned cobalt-manganese ore (wad), mixed with white lead—when oxide of copper is added a more lustrous black is obtained.[23] For the blue enamel, a very small quantity of cobalt suffices to give a brilliant colour. The various tints of the greens and blues derived from copper depend on the nature of the flux; of this we have already given an instance. Antimony in combination with lead gives a bright yellow, which tends to orange when a little iron is present; by the addition of more iron the colour of old bronze is imitated. Iron in the state of the sesqui-oxide is the source of many shades of red, but as this iron oxide will not readily combine with silica to form a transparent glass, it has to be applied as a more or less opaque paint, and thus differs from the other colours in being in perceptible relief. Hence the importance of the ruby red derived from gold, which was first introduced into China in the early part of the eighteenth century, and soon became the predominating colour in the decoration of the time (the *famille rose*).

The palette of the European enameller is a more extensive one, and each large porcelain manufactory has its book of recipes. The composition of the enamels and the relation of the metallic oxides to the fluxes employed have been systematically studied in more than one laboratory. It is only at Sèvres, however, that the results obtained have been made public. It has been the pride of successive generations of chemists—of Brongniart, of Salvétat, of Ebelmen, not to mention living men—to devise fresh sources of colour for the decoration of porcelain. First chromium, then nickel, cadmium, uranium, iridium, and platinum have been added to the list of metals from which enamel pigments have been derived. Among the colours of the muffle-stove the chief gain has perhaps been the discovery of the quality possessed by the oxide of zinc of altering the tints of other metallic oxides with which it is mixed.

[23] The same result may be obtained by painting one colour over the other, as we find in the black ground of the *famille verte*.

CHAPTER V
THE PORCELAIN OF CHINA

Introductory—Classification—The Sung Dynasty (960-1279)—The Mongol or Yuan Dynasty (1280-1368)

> *'La porcelaine de la Chine! Cette porcelaine supérieure à toutes les porcelaines de la terre! Cette porcelaine qui a fait depuis des siècles, et sur tout le globe, des passionnés plus fous que dans toutes les autres branches de la curiosité.... Enfin cette matière terreuse façonnée dans les mains d'hommes en un objet de lumière, de doux coloris dans un luisant de pierre précieuse.'*—Edmond de Goncourt, 'La Maison d'un artiste.'

In any work on porcelain it is something more than the premier place that must be given to the ware of China. We are dealing with an art Chinese in origin, and during a succession of many centuries Chinese in its development. It was only at a comparatively late time that the knowledge of this art spread over the whole civilised world. We in England have, as it were, acknowledged the pre-eminence of that country by adopting the word 'china' as an equivalent, more or less, to porcelain.[24]

It was under Imperial patronage that the art was developed in China, and the excellence of the porcelain of that country has in a measure varied with the taste and intelligence with which that patronage was exercised in different reigns. The native scholar and connoisseur has for ages been a collector of choice pieces, and his influence has always been exercised in a conservative direction. There is, indeed, in the whole world no such consistent *laudator temporis acti*, and it is this conservative spirit, resulting in a constant 'returning upon oneself,' that it is essential to bear in mind if we are to understand the involved relation of the old and the new in the history of the arts of China.

But the Chinese potter was not working only for the court or for the learned connoisseur, or again for the supply of the towns and villages. From the earliest times, or at least for the last thousand years, there has been a demand for his ware, small at first but slowly spreading, from the outer barbarian. Porcelain, or something akin to it, has been exported from China, by one path or another, from the time of the first Arab settlements at Canton and Kinsay in the eighth or ninth century; and thus a countervailing influence, acting in the direction of variety and change, at least as far as the decoration of the ware is concerned, has always been present. To give but two instances of this influence—we shall return to the subject later on: in the intimate connection of the Chinese court with Western Asia, and especially with Persia, in the thirteenth century, we may probably find the occasion of the first introduction into China of the blue decoration under the glaze; and with more certainty —the fact is indeed acknowledged by the Chinese—we may attribute the second great revolution in the decoration of porcelain, the use of enamel colours over the glaze, to European or Arab influence.

On the other hand, the decline that set in at the end of the eighteenth century was not a little hastened by the increased demand for ware decorated to suit the depraved taste of the 'Western barbarian.'

For in spite of his rigidity and his conservative spirit, the Chinese potter has always understood how to adapt his wares to the changing taste of his customers. Indeed the variation in the decoration, the subtle *nuances* in colour and design, that enable us to distinguish between the Chinese porcelain

[24] In Persia, where for three centuries at least the Chinese wares have been known and imitated, the word *chini* has almost the same connotation. See below for a discussion of the route by which this word reached England.

exported to India, to Persia, and to the nations of the Christian west, might be made the basis of a most interesting study.

When we come to consider the various factories of porcelain that sprang up in Europe in the course of the eighteenth century, we shall find that what strikes the inquirer above all (in comparison with the kindred arts of the time) is the little we can observe in the way of development either in the technique or decoration of the wares. The art springs up full-blown; what history there is is concerned rather with an artistic decline. It is only in China that we can hope to trace the steps by which this special branch of the potter's art attained to the perfection that we find in the products of the eighteenth century, and this alone is a reason for dwelling, even in a treatment of the subject so general and brief as this must needs be, on what may seem to some mere antiquarian detail.

But there is another and perhaps even a more important reason for our trying to form some idea of what the earliest wares of the Chinese were like: unless we make some such endeavour we shall find it impossible to understand the later history of porcelain in that country. One point must be specially borne in mind when we are attempting to follow the order in which fresh styles and designs were introduced in China. When a new method of decoration had been adopted and had come into general use—the introduction of underglaze blue in early Ming times, and that of coloured enamels at a later period, are cases in point—this did not involve the abandonment of the older styles. There was a constant effort to maintain the old methods, and in the most flourishing times of the emperors Kang-he and Kien-lung, the series of great men who had charge of the imperial works at King-te-chen, some of them practical potters themselves, were constantly occupied with the problems of reproducing the glazes, if not the pastes, of the earliest wares. During the reign of Yung-chêng (1723-1735), perhaps the culminating period in the history of Chinese porcelain, when Nien Hsi-yao was superintendent, a list was drawn up of fifty-seven varieties of porcelain made at King-te-chen. In this list the titles of all the old wares of the Sung dynasty are to be found, and to them the place of honour is evidently awarded (Bushell, chap. xii.). The names of some of these old wares, the Ko yao and the Kuan yao, for instance, are applied to porcelain in common use at the present day, an attribution based on the greater or less resemblance of this modern ware to the Sung porcelain, at least in the matter of the glazes.

It is only quite of late years that we in Europe have been able to make any clear distinction, not only between the different classes of Chinese porcelain, but between what is Chinese and what is not. A few years ago the most characteristic porcelain of Japan was classed as Chinese, while on the other hand Corea and even local English factories were credited with porcelain made and decorated in one or other of the former countries.

It is nearly two hundred years since the famous letters of the Jesuit missionary, the Père D'Entrecolles, were written, and these letters still remain our best source of information for the processes of manufacture at King-te-chen. There was little further information on the subject from the Chinese side[25] until, in 1856, Stanislas Julien translated part of a Chinese work treating chiefly of the same porcelain factory—this is the *King-te-chen Tao Lu*, a book which contains in addition some information about the history of the different wares. This translation was for many years the only native source of information available to students of Chinese porcelain, and many were the misconceptions and blunders in which these students were landed. The book was indeed accompanied by a preface and valuable notes by M. Salvétat, the porcelain expert of Sèvres, but Julien himself, though an eminent Chinese scholar, had no practical acquaintance either with the matter in hand or indeed with the country generally.

[25] During the eighteenth century, however, the French missionaries remained in friendly relation with the Chinese court, especially with the Emperor Kien-lung, a man of culture and a poet. The Père Amiot sent home not only letters with valuable information, but from time to time presents of porcelain from the emperor. He was in correspondence with the minister Bertin, who was himself a keen collector of porcelain. See the notes in the Catalogue of Bertin's sale, Paris, 1815.

The beginning of a sounder knowledge of the subject was made when that collector of genius, the late Sir A. Wollaston Franks, published a catalogue of the private collection of Japanese and Chinese porcelain which he afterwards presented to the nation. His marvellous intuition and his vast experience enabled him to seize upon points of resemblance and difference which threw light upon the origin of the various wares, and to expose at the same time the inconsistencies of the arrangements then in vogue. He it was who first pointed out the general worthlessness, as a guide to the date or even the country of any piece of porcelain, of the name of dynasty and emperor which it might bear. His successor, Mr. C. H. Read, has well carried on the tradition. At the present moment the British Museum is one of the few places where an attempt has been made at a systematic arrangement of a representative collection of Chinese and Japanese porcelain.[26]

In the meantime in China itself, both in connection with the embassies at Pekin and among some of the merchants at Shanghai and other treaty ports, much information was being collected, and it was above all the merit of Franks to keep himself in communication with and to encourage all such research. Dr. Hirth, long in the service of the Chinese at Shanghai and elsewhere, has published a series of learned studies treating of the relation of the Chinese to the Roman empire, of the Arab traders during the Middle Ages, and of the early history of Chinese porcelain generally. But it is to a former member of our embassy at Pekin, to Dr. Bushell, that we are above all indebted for the throwing open of Chinese sources of information upon the history of porcelain. A worthy successor of the Père D'Entrecolles in his intimate acquaintance with the country and its language, Dr. Bushell is well abreast of the chemical and technical knowledge of the day, and his position as physician to our embassy at Pekin has given him access to information from the best Chinese sources, as well as to the treasures of many of the native collections of the capital.

Dr. Bushell has written the text to a sumptuously illustrated work, nominally a catalogue of the collection of porcelain formed by the late Mr. Walters of Philadelphia, and into this text he has woven all the vast wealth of material that he had accumulated during many years of study both at Pekin and in Europe. This work has thus superseded all other sources of information on the history and manufacture of Chinese porcelain. He has, in fact, ransacked all that has been written in China on these subjects, and his translations have this advantage over the works of Julien, that they are made by one who knows thoroughly the subject that the Chinese author is dealing with.

We must not forget the researches on the chemical and technical side of the subject by what we may call the school of Sèvres. To these workers we have made frequent reference in previous chapters. It is to the experiments and analyses of men such as Brongniart, Salvétat, Ebelmen, and Vogt, that we are indebted for our knowledge of the chemical constitution of the paste, the glaze, and the enamels of Chinese porcelain, as well as for a rational exposition of the methods of its manufacture. To sum up, our sources of information of late years are, in the main, English, as far as the history and what I may call the sinology of our subject are concerned; but for the chemistry and technology we must turn to French works. As far as I know, little of value has been published in Germany on the subject of Oriental porcelain. The discussion between Karabacek, Meyer, and Hirth (whose later papers have been published in German) on the early history of celadon and on the Arab traders of the Middle Ages, is perhaps the most notable exception.

We are in the dark even now as to the date and place of origin of more than one class of Oriental porcelain. On the question of the relation of the ceramic wares of China to the contemporary sister arts, there are many points to be cleared up,—I mean especially the question how far the early wares were influenced by the art of the bronze-caster and the carver of jade, and again to what extent the decoration of porcelain in later times was dependent upon the example of the contemporary schools of painting. When we know about the pictorial art of the Chinese even the little that we do already of that of their Japanese neighbours, we shall, to give but one instance, be able to trace the source

[26] Thanks to the industry of the present curator, Herr Zimmermann, the same may now be said of the great collection at Dresden.

of the beautiful landscapes and flower designs that we find on the vases and plates of the *famille verte* and *famille rose*.

There is one source of information which remains as yet almost completely untapped. The Japanese have been for many centuries keen collectors of Chinese porcelain, as of other Chinese objects of art. They have their own views on its history, and some of the finest specimens of the older wares remain still in Japan, in spite of the many pieces that have of late years been carried away to Europe and America. As we shall see, they have in their own pottery and porcelain handed on to quite recent days many traditions of Ming and earlier times that have been lost in China. If some Japanese connoisseur or antiquary, strong in Chinese lore, could give us a history of porcelain from his own point of view, I think that European investigators would have cause to be grateful.

Much could be gleaned, as I have already said, by studying the relation of the potters art to that of the jade-carver and the caster of bronze, and this brings us to an important point that perhaps has not been fully appreciated by us in the West. I refer to the comparatively late date of the beginning of porcelain in China compared, for example, to the arts just mentioned. We can hardly carry back the history of true porcelain beyond the great Tang dynasty (618-907 A.D.), and even in China there is no existing specimen that can safely be attributed to so early a date. But this same Tang dynasty was the very heyday in that country, not only of military power but also of artistic culture. It would be impossible to enter into this important subject here; it is one that has been strangely ignored by us in Europe. Suffice to say that the great figure-painters of this period were looked back to with veneration in later times, both in China and in Japan, and that the two schools of landscape, the colour school of the North and the black and white 'literary' school of the South—schools whose traditions have survived to the present day—were both founded by Tang artists. At that time art critics were known (and even honoured); they already wrote books on the early history of painting, and they have left us descriptions of famous collections.

We may expect, then, to find the influence of these more precocious arts on the early fictile ware of China, and indeed we see the quaint decoration and the not too beautiful outlines of the early hieratic bronzes repeated on the rare specimens that survive from the dynasty that after a period of unrest followed that of Tang. This was the Sung dynasty, which lasted till the time of the Mongol invasion in the thirteenth century.[27]

It is difficult for a European to appreciate the charm, or rather superlative excellence, that is found by a Chinaman in a fine specimen of jade. It is, however, a substance that is closely linked with his philosophy, his religion, and above all with his all-important ceremonial. No wonder, then, if from an early time he strove, with the pastes and glazes at his command, to imitate such a material. And numberless references in contemporary writers, as well as the evidence of many of the oldest pieces of porcelain surviving, show that this was the case. We may safely say that in these early specimens the thick glaze, of tints varying from a true celadon to a more pronounced blue or green, was admired in proportion to its resemblance to jade. As for the porcelain itself, all that was looked for in the paste was that it should be hard, and that the vessel when struck should give out a bell-like sound—'a plaintive note like a cup of jade,' as one early Chinese writer says of a porcelain cup in his collection.

The Chinese in these times possessed also elaborately carved vessels of rock crystal and of various kinds of chalcedony, and these also it was attempted to imitate with the early glazes. Glass, too, as a material for small objects, was probably known; it seems, however, to have been somewhat of a rarity. It is mentioned by writers of the Tang period in connection with these early wares, and indeed it is possible that there may be some confusion in the literature of the time (or rather perhaps in our interpretation of the language used) between the two materials—the thickly glazed porcelain and the more or less opaque glass.

[27] For a discussion, and for many illustrations of the art of these early dynasties which survives chiefly in objects of jade or bronze, see Paléologue, *Art Chinois*, Paris, 1887.

After these preliminary remarks we shall be in a better position to interpret the somewhat involved and contradictory allusions to our subject found in Chinese books.

We now come to the important question of the classification of Chinese porcelain. A difficulty here arises from the rival claims of two systems. The older and perhaps safer division depends solely on the nature of the ware, its colour, decoration, etc.; but in opposition to this the claim of the more logical, historical classification has, with our increasing knowledge, become of late years more pressing. The result has been an attempt to combine the two systems. Such an attempt must necessarily lead to many compromises, and yet something of the sort is perhaps the only available plan. We may compare the development of the ceramic art in China to what has taken place in the evolution of the animal kingdom: while new and more elaborated forms are evolved, the older ones, or many of them, survive in but slightly modified forms. If this tendency be borne well in mind there will be less danger of confusion between the really old types and the modern representations or even copies which are called, in China, by the same names.

The three classes into which Chinese porcelain is divided—and there is a general agreement among collectors on this head—rest on such an attempt to combine a historical with a technical classification:—

1. Porcelain with single-coloured glazes, including plain white ware. The colour of the glaze is derived from two metals only, iron and copper. Any further decoration depends upon the moulding of the surface or upon patterns incised in the paste. All the wares made up to the end of the Sung period (1279 A.D.) may probably be included in this class.

2. Porcelain decorated with colour under the glaze. This division is nearly equivalent to our 'blue and white' ware, but in addition to cobalt, copper is at times introduced to give a red colour. This system of decoration was probably introduced during the course of the fourteenth century, and it is associated with the Ming dynasty.

3. Porcelain decorated with enamels over the glaze, necessitating a second firing in a muffle-stove. The use of these fusible enamel colours came in probably during the sixteenth century, but the art was not fully developed till much later.

The glazes of the first and second classes as a rule contained no lead, and to melt them the full heat of the oven, the *grand feu*, was required.

There is, however, a class of porcelain which does not fall well into any of the above divisions, but which is historically of great importance. The blue, purple, and yellow glazes of this ware were *painted* on the biscuit after a preliminary baking of the paste, and then fired, not in the hottest part of the furnace, but in what we may call the *demi grand feu*. The glaze of this ware contains lead, and this fact and the method of the decoration may be held to give it a position bridging over the interval between our first two classes and the third—that of enamelled porcelain. This ware, *painted on the biscuit*, dates, however, from an earlier time than the latter class, and must not be confused with it.

As I have pointed out, these types did not entirely replace one another, for the earlier forms continued to be made by the side of the later.

One of our principal difficulties in discussing the early wares of China is to reconcile and co-ordinate the various types described in old Chinese books with the few specimens surviving at the present day. Of these scanty examples we can point to scarcely any in public collections; the rare pieces that have been brought from China are in the hands of private collectors in England, France, and America. In the Chinese authorities we find as early as the tenth century references to porcelain which was 'blue as the sky, brilliant as a mirror, thin as paper, and as sonorous as a piece of jade'; an emperor who reigned just before the accession of the Sung dynasty (960 A.D.) demanded that the porcelain made for him should be 'of the azure tint of the sky after rain, as it appears in the interval between the clouds.' Compare with these descriptions the thick paste, barely translucent, the heavy irregular glaze, greyish white to celadon or pale blue, of the few specimens of undoubted antiquity that have survived to our day. How can we reconcile the tradition with the material evidence? Two

explanations have been given of the discrepancy. According to one theory, all the more delicate and fragile pieces have disappeared 'under the hands of time' (or shall we say more definitely under those of endless generations of housemaids?), only the heavy, solid specimens surviving. The other theory is simpler: it is that the writers of the books are apt to fall into exaggeration when speaking of any matter that has the sanction of age—that, not to mince matters, they are as a class great liars; and this is a point of view that commends itself to those who have any acquaintance with Chinese literature.[28]

We have now, however, one source of information for these early wares upon which, although it is in a measure a literary source, we can place greater reliance. This is nothing less than an illustrated list, a *catalogue raisonné*, of famous specimens of porcelain, drawn up by a distinguished Chinese art connoisseur and collector as long ago as the end of the sixteenth century. In this manuscript there were more than eighty coloured reproductions of pieces, both from the author's own collection and from those of his friends. The work came from the library of a Chinese prince of high rank, and it was purchased in Pekin by Dr. Bushell some twenty years ago. Since then this valuable document has perished in a fire at a London warehouse, where it had been deposited, but not before the illustrations had been copied by a Chinese artist and its owner had made a careful translation and analysis of its contents.[29] The writer, Hsiang-yuan-pien, better known as Tzu-ching, after giving a brief sketch of the early history of ceramics in his country, exclaims apologetically: 'I have acquired a morbid taste for pot-sherds. I delight in buying choice specimens of Sung, Yuan, and Ming ware, and exhibiting them in equal rank with the bells, urns, and sacrificial wine-vessels of bronze dating from the three ancient dynasties, from the Chin and the Han' (2250 B.C. to 220 A.D.)—that is to say, in placing them in the same rank as antiquities that are acknowledged to be worthy of the attention of the scholar. Porcelain at that time, we see, had hardly established its claim to so dignified a position; hence the apologetic tone. After telling us how with the advice of a few intimate friends he had selected choice specimens, which he then copied in colour and carefully described, Tzu-ching concludes with these words: 'Say not that my hair is scant and sparse, and yet I make what is only fit for a child's toy.' This appeal is evidently addressed to the Lord Macaulays of his day.[30]

The first point to notice in this catalogue is that more than half of the objects described are attributed to the Sung period (960-1279 A.D.), that is to say, they were at least three hundred years old at the time when Tzu-ching wrote. The Sung dynasty, we must bear in mind, was above all remembered as a period of great wealth and material prosperity. Less warlike than the Tang which preceded it, the arts were cultivated at the court of the pleasure-loving emperors who had their capital during the earlier time at Kai-feng Fu (in the north of Honan, near to the great bend of the Hoang-ho). When driven south by the advance of the more warlike Mongols they retired to Hangchow, the Kinsay of which Marco Polo has such wonderful tales to relate. In these early days there was no great centre for the manufacture of porcelain; it was made in many widely separated districts, so that the classification of these early wares is, in a measure, a geographical one. At King-te-chen, at least in the later Sung period, they were already making porcelain, but for court use only, it would appear, for at that time the factory was a strict imperial preserve, and its wares did not come into the market.

As to the still older wares, those of Ch'ai and of Ju, which generally hold the place of honour in Chinese lists, it was of the first that the emperor spoke when he commanded that pieces intended for his own use should be clear as the sky after rain; but no specimen of this porcelain was extant even

[28] The wild statements as to the transparency, above all, of the Sung and even the Tang porcelain may, however, appear to receive some confirmation from the reports of the old Arab travellers. But how much credence we can give to these authorities may be gleaned from a description of the fayence of Egypt, by a Persian traveller of the eleventh century. 'This ware of Misr,' he says, 'is so fine and diaphanous that the hand may be seen through it when it is applied to the side of the vessel.' He is speaking not of porcelain, but of a silicious glazed earthenware!

[29] *Pekin Oriental Society*, 1886; see also Bushell's *Ceramic Art*, p. 132 seq.

[30] See the passage in his *History* (chapter ix.) where this stern censor, referring to the passion for collecting china, rebukes the 'frivolous and inelegant fashion' for 'these grotesque baubles.'

in Ming times. Its place, it would seem, was taken by the Ju Yao (the word *yao* is about equivalent to our term 'ware'), which, like the Ch'ai, came from the province of Honan. This ware also is now practically extinct; Tzu-ching, however, claims to have possessed some specimens, and of these he gives more than one illustration. The glaze was thick and like melted lard (a comparison often made by the Chinese), and varied in colour from a *clair-de-lune* to a brighter tint of blue. The name Ju, we may add, is often applied to more modern glazes which resemble the old ones in colour and thickness.

The name Kuan yao, which means 'official' or 'imperial' porcelain, has been the cause of much confusion; the term has been applied to any ware made for imperial use. That of the Sung dynasty was made in the immediate neighbourhood of the imperial court, first at Kai-feng Fu and later at Hangchow. In its more strict use the term Kuan yao is applied to pieces generally of archaic form, to censers ornamented with grotesque heads of monstrous animals, and to wares of other shapes copied from old ritual bronzes. The glaze varies in colour from emerald green to greyish green and *clair-de-lune*, it is generally crackled, the cracks forming large 'crab-claw' divisions. Other kinds are described as white and very thin, but of these, perhaps for one of the reasons given above, no examples have survived to our day.

Lung-chuan yao and Ko yao. It will be convenient to class together these two most important types of Chinese porcelain. At the present day these names are applied in China to some comparatively common varieties of porcelain, not necessarily of any great age. But more strictly Lung-chuan yao is the term used by the Chinese for the heavy celadon pieces, whether dating from Sung or from Ming times, which were the first kinds of porcelain to become a regular article of export; while the word Ko yao is used as a general name for many kinds of crackle ware, which may vary in colour from white to a full celadon. In a more restricted sense it includes only the early pieces with a greyish white glaze and well-marked crackles.

Lung-chuan ware was made during Sung times at a town of that name in the province of Chekiang, situated about halfway between the Poyang lake and the coast. In Ming times the kilns were removed to the adjacent provincial capital, Chu-chou Fu, nearer to the coast. This was probably the ware that Marco Polo saw when passing through the town of Tingui. It was largely exported from the ports of Zaitun and Kinsay. It will, however, be better to defer the discussion of this thorny question to a later chapter, when we shall have something to say about the way in which the knowledge of Chinese porcelain was spread through the Mohammedan and Christian west. It will be enough for the present to mention that the Lung-chuan ware was the original type and always remained one of the principal sources of the Martabani celadon so prized in early Saracen times.

As this is the first time that we come across celadon ware,[31] we may mention that we use the term in the older and narrower sense for a greyish sea-green colour tending at times to blue. The name is, however, sometimes made to cover nearly the whole range of monochrome glazes. It is the *Ching-tsu*[32] of the Chinese and the *Sei-ji* of the Japanese.

The true Lung-chuan celadon of Sung times was, however, of a more pronounced grass-green colour. But we are concerned rather with the later celadon made at Chu-chou Fu during the Ming period. For it is to this time that we must refer most of the heavy dishes and bowls, often fluted or moulded in low relief with a floral design of peony or lotus flowers, or again with plaited patterns surrounding a fish or dragon which occupies the centre; in other examples the decoration is engraved in the paste. In either case, whether moulded or engraved, the glaze accumulating in the hollows helps

[31] The name Céladon first occurs in the *Astrée*, the once famous novel of Honoré D'Urfé. When later in the seventeenth century Céladon, the courtier-shepherd, was introduced on the stage, he appeared in a costume of greyish green, which became the fashionable colour of the time, and his name was transferred to the Chinese porcelain with a glaze of very similar colour, which was first introduced into France about that period.

[32] Julien translated the word *ching* as blue, an unfortunate rendering in this case, which has been the cause of much confusion. He was so far justified in this, in that the same word is used by the Chinese for the cobalt blue of our 'blue and white,' while it was not applied by them to a pronounced green tint.

to accentuate the pattern. The paste as seen through the glaze where the latter is thin appears white, but where the glaze is absent, as on the foot, or where it is exposed by bubbles or other irregularities, the ground is seen to be of a peculiar reddish tint. By this test the Chinese claim to distinguish the older celadon, the true *martabani*, from the later imitations made at King-te-chen. The paste of these later copies is often artificially coloured on the exposed surface so that they may resemble the old ware (Hirth, *Ancient Porcelain*, pp. 21 *seq.*).

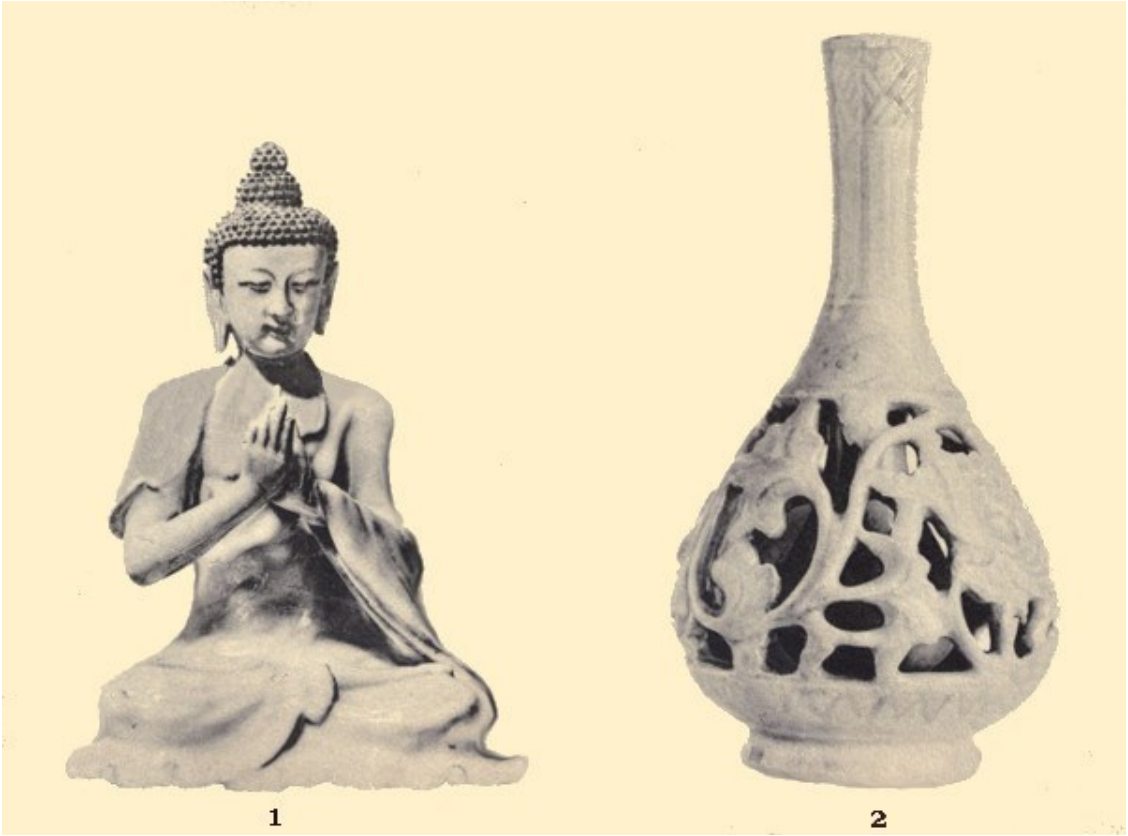

PLATE III.
1—CHINESE, CELADON WARE
2—CHINESE, CELADON WARE

As for the Ko yao, the old ware of Sung times is said to have been first made in the twelfth century. The Chinese character with which 'Ko' is written means 'elder brother.' According to the books there were at this time at Lung-chuan two brother potters named Chang. The elder brother leaving the younger Chang to continue in the old ways, started to make a new ware distinguished by the crackle of its glaze. This was originally a thick, heavy ware, with the iron-red foot and white paste already noticed, but, as we have said, the name is now used for a large class of crackle ware with a glaze of celadon, of greyish white and especially of a yellowish stone colour. This porcelain with grey and yellowish crackle does not seem to have been so largely exported as the uncrackled celadon; bowls and jars of a similar ware have, however, been found in Borneo and in the adjacent islands.

Chün yao.—It is to this ware that we may trace back the now famous family of *flambé* porcelain. Chün yao was already made in early Sung times, *i.e.* before the Mongol conquests of the twelfth century, in Honan, not far from the old capital of Kai-feng Fu. A description in a work of the seventeenth century leaves no doubt as to its identification. 'As to this Chün yao,' the writer says, 'a fine specimen should be red as cinnabar, green as onion-leaves or the plumage of the kingfisher, and purple, brown, and black like the skin of the egg-plant.' We have here the description of that 'transmutation' or *flambé* ware of which such magnificent examples were made at King-te-chen in

the seventeenth and eighteenth centuries, and which has lately been successfully imitated in France. The play of flashing colour in the glaze was said to have been originally the result of accident, but we must not attach much importance to statements of this kind. In the old Sung pieces the clay is less white and fine than in the highly finished examples made at King-te-chen during the reigns of Kang-he and Yung-cheng. On the Sung ware we may frequently find a number (from one to nine) engraved, sometimes more than once, in the paste, and these characters are carefully copied in the later reproductions. We have here perhaps the earliest instance of the employment of a mark on porcelain. The old writers tell us apologetically of the vulgar names given, by way of joke, it would seem, to these glazes, such as mule's lungs or pig's liver—no inapt comparisons, however, for some of the effects seen in these old wares. These varied hues were of course obtained from copper in the first place, though the presence of iron, in both stages of oxidation, may sometimes add to the variety of the tints.

Kien yao.—This was a dark-coloured ware made at Kien-chou, north-west of the port of Fuchou. It must not be confused with the well-known creamy-white ware of Fukien, exported in later days from the same port. Certain shallow conical cups of this ware, with a vitreous glaze, almost black, but relieved around the margin with small streaks and spots of a lighter colour, were especially valued from very early times for the preparation of powdered tea—nowhere more than in Japan, where an undoubted specimen of this Kien ware is treasured as a priceless heirloom. There is an excellent specimen in the British Museum: a careful examination of this little bowl will give no little aid in understanding what are some of the qualities that are looked for in China and Japan in these old glazes. There is a quiet charm in the glassy surface, and an air as of some quaint natural stone carefully carved and polished rather than of a product of the potter's wheel.

Ting yao.—In the Ting yao of the Sung dynasty, as in the case of the contemporaneous celadon and crackle wares, we have the oldest type of an important class of porcelain. The earlier specimens have served more than once as models for famous potters of Ming and later times. It was probably at Ting-chou, a town in the province of Chihli, to the south-west of Pekin, that a brilliant white porcelain was first successfully made by the Chinese, possibly as early as the time of the Tang dynasty; and the name of Ting yao has remained associated with all pure white wares of a certain quality, even though made at other places. As in the case of the celadon porcelain, the decoration, if any, was either in low relief or incised in the paste; but in opposition to many of the other wares we have mentioned, the Ting porcelain seems from the first to have been made from a paste of great fineness, its translucency was at times considerable, and the patterns were engraved or moulded with much delicacy. The design when engraved is scarcely visible unless the vessel is held up to the light. The specimens of Ting ware that survive date probably from Mongol or from Ming times. The British Museum possesses a remarkable collection of these Ting bowls and plates. A pair of very thin pure white shallow bowls are noticeable as having in the centre an inscription finely engraved in minute characters under the glaze. It is the nien-hao or year-mark of the Emperor Yung-lo (1402-1424), the first great name among the emperors of the Ming dynasty. This is perhaps the earliest date-mark with any pretentions to genuineness that has been found on the Chinese porcelain in our collections. The decoration, in this case, is formed by a five-clawed dragon faintly engraved in the paste. These bowls are specimens of the *feng* or 'flour' Ting ware (also known as *Pai* or 'white' Ting), but most of the Ting plates in the same collection are of quite another kind of ware, which has a surface like that of a European soft-paste porcelain—this the Chinese know as the *Tu-Ting* or earthy Ting. This latter ware has in fact a soft lead glaze covering a hard body, and must therefore have required two firings, the first to thoroughly bake the paste, and a second at a lower temperature to melt the glaze on to it. Some of the specimens of this *Tu-Ting* in the British Museum are said to date from Sung times. I do not know what is the authority for the use of a lead glaze in China at so early a date. Many of these plates have certainly a great appearance of age, but this antique look is due in some measure to the 'weathering' of the soft glazes on the exposed surfaces. This weathering has brought

into prominence the very graceful decoration of lotus-flowers, but the surface is often discoloured by stains as of some oily matter which has apparently found its way under the glaze. The copper bands with which the edges of many of these plates are bound are mentioned in the old accounts; those in use in the palace, it is said, were fitted thus with collars to preserve the tender material.

We must postpone the account of the rival white ware, the creamy porcelain of Fukien, or later Kien yao, as none of it was made as early as the time of the Sung dynasty. The Kien yao of that time, as we have seen, was quite another ware.

We have now mentioned the most important of the classes of Chinese porcelain that date from early times. We have confined our brief notice to the varieties of which specimens have survived, laying special stress upon those kinds which have, as it were, founded a family, and which we can therefore study in specimens from later ages. The names of many other wares of both the Sung and Tang periods may be found in Chinese books, but of these we do not propose to say a word.

The paste of these early wares is rarely of a pure white, and their translucency is generally very slight, but they are not for that reason to be classed as stonewares. The materials were probably in all cases derived from granitic rocks, that is to say, from a more or less decomposed granite (containing mica and often a certain amount of iron) mixed with some kind of impure kaolin. Professor Church, in his Cantor Lectures, gives us two analyses of 'old Chinese ware,' which confirm this view. One specimen, with a white body, was found to contain 75 per cent. of silica, about 18 per cent. of alumina, and about 5·5 per cent. of alkalis (chiefly potash). The other, of brownish coloured paste, contained a little less silica, but as much as 2·5 per cent. of iron. For the roughly prepared material of these old wares we would prefer the name of proto-porcelain or kaolinic stoneware, so that there may be no confusion with the true stoneware of Europe, a quite different material.[33]

In the absence of more ordinary clays in the central and northern parts of China, some such kaolinic pottery may have been made by the Chinese from very early times. When in Tang or in earlier days it occurred to them to attempt to imitate jade or other natural stones, they had the good fortune to be already using materials that allowed of these experiments being after a time crowned with success. The important point that still remains unsettled is at what date they first succeeded in covering a ware of this class with a vitreous coating. For the date of the first use of glaze in China we can at present only give a very wide limit, let us say some time between the first and the fifth century of our era. Very probably it was their acquaintance with the nature of glass that put them on the right track. This material, it is said, they first knew of from their intercourse with the later Roman empire. There is some reason to believe that they acquired at the same time the secret of its manufacture, though, according to the Chinese, the art was lost at a later time.[34]

We can now form some idea of how far the art of making porcelain had advanced at the time when the tide of the Mongol invasion swept over the country. Our knowledge of the wares made at this time must be derived chiefly from the imitations of the older porcelain made at a later period, but in such a conservative country as China this reservation is of no great importance. We must remember that in all these wares there was no other decoration than that given by the glaze as applied to the variously moulded or incised surface of the paste. The nature of the glaze was therefore of pre-eminent importance. The range of colour, except in the rare *flambé* vases, was in the main confined to shades of blue and green, and even of these colours pronounced tints are rare. All the colours at the command of the potters of these days were derived from the oxides of iron and copper. And yet with such simple elements, what an infinite variety! It has been truly said by a French writer that the beauty of the glaze is the *qualité maîtresse de la céramique*, and it is partly a recognition of this claim that has led so many French and American collectors, of late, to follow the example of the Chinese

[33] I shall return to this point when treating of English porcelain.

[34] Somewhat later the Chinese were for a time neighbours of the Sassanian empire, where the arts of glazing pottery and making glass were highly developed. Sassanian bronzes, and probably textiles, have found their way to Japan.

and Japanese connoisseurs, and to give so marked a preference to monochrome porcelains, which owe their charm to the merits of the glaze alone. But the specimens we find in these collections are with but few exceptions of much later date. The price that a fine piece of Sung ware, above all if it has a good pedigree and comes from a known collection, has always commanded in China has sufficed, at least until quite lately, to keep such specimens in their native country.

PLATE IV. CHINESE

As we have said, there are very few examples in our public collections that can with any assurance be attributed to Sung times. In the British Museum, in the same case with the Kien yao tea-bowl already mentioned, is a jar some twelve inches in height, with two small handles on the shoulder. It is of irregular shape and covered with a thick glaze of a pale turquoise blue, faintly crackled. Close to the mouth is a bright red mark, like a piece of sealing-wax, due probably to the local partial reduction of the copper. This beautiful but very archaic-looking jar (Pl. iv.) is attributed to no earlier date than the later or southern Sung dynasty (1127-1279). Among the large number of crackle monochrome pieces in the same collection there are many specimens which a Chinese connoisseur would classify as Ko yao, and similarly some of the old *flambé* pieces might be termed Chün yao, without definitely assigning them to Sung times. The Lung-Chuan celadons are represented by some early pieces, more than one distinguished by the red foot. There are some fine plates of old heavy celadon at South Kensington, not a few purchased in Persia. Here may also be found a celadon jar cut down at the neck; and the 'mouth' thus artificially formed has been carefully stained of a red colour to imitate the old ware. The French museums are particularly rich in specimens of old *martabani* celadon—I would point especially to several large dishes both at Sèvres and in the *Musée Guimet*. But what is perhaps the finest collection in Europe of celadon and other old wares is now to be seen in the museum at Gotha. It was brought together by the late Duke of Edinburgh, who added to previous acquisitions the collection formed in China by Dr. Hirth.

Yuan Dynasty (1280-1368)

Probably at no period during its long history has the Chinese empire been subjected to such a thorough shaking up, to such a complete upsetting and reversal of its ancient ways, as during the advance of the Mongols from the north to the south during the twelfth and thirteenth centuries. When they had at length subdued the whole land, there was a moment during the rule of the liberal-minded Kublai Khan when the old barriers and prejudices seemed to have been broken down, and when the Middle Kingdom appeared to be about to enter the general comity of nations. This is what gives to Marco Polo's account of the country, which he visited at the time, so very 'un-Chinese' an air. We hear of Italian friars and French goldsmiths at the court, and of projected embassies from the Pope. Still closer were the relations with the Mohammedan people of Western Asia, then ruled by members of Kublai's family. Marco Polo, we know, formed part of the escort of Kublai's sister, when she travelled by sea to Persia to become the bride of the Mongol khan of that country; and a predecessor of this latter ruler, Hulugu, as early as the middle of the thirteenth century, brought over, it is said, as many as a thousand Chinese artificers and settled them in Persia.

And yet when scarcely two generations later the degenerate descendants of Kublai were driven from the imperial throne and replaced by a native dynasty, what slight permanent trace do we see of all these changes reflected in the arts of the Middle Kingdom! No doubt, on looking closely, we should find that a change had taken place during these years: new materials had been brought in, new forms and new decorations applied to the metal ware and the pottery of the Chinese. It is in connection with these two arts especially (and we may add to them the designs on textile fabrics) that we find so many points of interest in the mutual influence of the civilisations of China and Persia at this time. We must remember that in the thirteenth century the craftsman of Persia, as the inheritor of both Saracenic and older traditions, was in many respects ahead of his rival artist in China.

As far as the potter's art was concerned this was the first meeting of two contrasted schools, which between them cover pretty well the whole field of ceramics—of that part at least of the field in which the glaze is the principal element in the decoration.[35]

[35] The salt-glazed ware of Europe seems to be the only important exception to this perhaps rather sweeping generalisation.

The Persian ware of this time was the culminating example of an art that had been handed down from the Egyptians and the Assyrians. As a rule, among these races, the baser nature of the paste had been concealed by a more or less opaque coating either of a fine clay or 'slip,' or of a glaze rendered non-transparent by the addition of tin; it is on this coating that the decoration is painted, to be covered subsequently (in the first case at least, that of the slip ware) by a coating of glaze. It is to this large class, for the most part to the latter or stanniferous division, that nearly all the famous wares of the European renaissance belong, not only the Spanish and Italian majolica but the enamelled fayence of France and Holland as well. It was with the latter two wares that at a later date the porcelain of China was destined to come into competition. Each of these ceramic schools, the Eastern porcelain and the Western fayence, might in certain points claim advantages over the other, advantages both of a practical and of an æsthetic nature. For example, the glory of the Persian fayence of that day lay in its application to architecture, in the brilliant coating of tiles that covered the walls and the domes of the mosques and dwellings both inside and out. The Chinese have never succeeded in making tiles of any size with their porcelain. When used for the decoration of buildings the porcelain, or rather the earthenware, is always in the form of solid, moulded bricks.

But there is another matter with which the Chinese who visited Western Asia at that time cannot fail to have been struck—with the materials, I mean, at the command of the Persians, for the application of colour both under and over the glaze. Of the decorations over the glaze the most important were those given by their famous metallic lustres. This lustre, we now know, was the result of an ingenious process by which a film of copper, or sometimes of silver, was developed on the surface of the glaze.

The Chinese have never attempted anything of the kind, in part because such a method of adornment was foreign to their notions of what was fitting. For we must bear in mind that the influence of the literary tradition in China has always tended towards simplicity of means in their decorative arts, and has been opposed to anything like an ostentatious display of expensive materials. Any marked infringement of this sentiment, even on the part of an emperor, has always called forth a protest from the censors. Another cause which hindered the adoption of the lustre decoration by the Chinese may be found, no doubt, in the difficulties of its practical application. At that time the processes of the muffle-stove for decoration over the glaze were quite unknown to them.[36] But the Saracens, in Western Asia, were already in possession of another means of decorating their ware. This they found in the use of cobalt, especially as a material for painting a design on the paste before the application of the glaze. We find this colour at times on the tiles that lined their prayer-niches; these indeed date from a somewhat later time. But there is another variety of Saracenic ware of which a few specimens have survived. I refer to the vases and bowls covered with a thick alkaline glaze, and decorated, in part at least, *under the glaze* with a design of black lines and some rude patches of blue. These rare vases were formerly classed as Siculo-Moorish, but later research has proved most of them to be of Persian or perhaps rather of Syrian or Mesopotamian origin. They appear to be the work of thirteenth century potters, and some of them may be of even earlier date.[37]

When we consider that there is no evidence of the use of cobalt by the Chinese for the decoration of their porcelain during Sung times, that indeed the use of colour apart from that of the glaze as a means of decoration appears to have been then unknown; but that, on the other hand, not long after the turmoil of the Mongol invasion and domination—a period during which the two countries, China and Persia, were so closely connected—we find the use of cobalt as a decoration

[36] It is possible, however, that some of the various tints of brown used from early Ming times, especially that known to the Chinese as 'old gold,' may have been suggested by this copper lustre. The ground on which this lustre is superimposed in some old Persian wares is of a very similar shade. Dr. Bushell mentions a tradition that the old potters tried to produce a yellow colour by adding metallic gold to their glaze, but that the gold all disappeared in the heat of the *grand feu*. They had therefore to fall back upon the *or bruni*.

[37] Consult for this ware the beautifully illustrated monographs of Mr. Henry Wallis on early Persian ceramics.

sous couverte firmly established, we may, I think, regard it as not improbable that it was from the Persians that the Chinese learned the new method of decoration.[38]

The influence of the Saracenic art of Western Asia is indeed now for the first time to be seen in other directions, and we shall find it cropping up here and there during the whole of the following Ming period. It was the source of many new forms which we see now for the first time in China: the graceful water-vessels, for instance, with long necks and curved spouts, copied from the Arab *Ibraik*. Again, we find this influence at times in the *motifs* of the conventional floral patterns found on Ming porcelain, though these patterns, indeed, are always mere counterchanges, as it were, upon a field of an unmistakable Chinese stamp (Pl. vi.). All these changes were doubtless regarded as anathema by the Chinese censors, who reminded the rash innovators that the great men of old were content with simple materials and forms, and that they in their wisdom rejected all such meretricious ornament. For it was seriously maintained that had they thought it desirable, these old sages could have commanded all the resources of the later potter, not only the larger field he could draw from for his designs and colours, but the improved paste of his porcelain as well.

On the other hand, the Chinese influence at this time on Persian art was small. By a careful search we may find at times a dragon or a phœnix amid unmistakable Chinese clouds on the spandrel above the arch of a Persian prayer-niche of the fourteenth century, or forming the centre of a star-shaped tile. But the great invasion of Chinese wares and Chinese schemes of decoration belongs, as far as the fictile art of the country is concerned, to a later period, that of Shah Abbas in the early years of the seventeenth century.

It is not unlikely that in China the Western influence did not make much way until the time of the early Ming emperors, and that it was due more immediately to the growing commercial intercourse with the Persian Gulf, but this intercourse was itself fostered by the events of the Mongol invasion.

There is very little to be said of the porcelain made during the time of the Mongol or Yuan dynasty, and we have few specimens that can be definitely assigned to that period. The name is still given in Pekin to a rude, somewhat heavy ware, with a thick glaze of mingled tints, among which a shade of lavender with speckles of red predominates. This is but a modification of the Chün yao of Sung times, and belongs in a general way to the class of 'transmutation' wares—those in which the colours depend on the partial reduction of the oxides of iron and copper in the glaze. Specimens of this ware that claim to be of Chinese origin are often found in Japan, where they are much in favour for use as flower vases, but neither in that country nor in China have the pieces we meet with much claim to any great antiquity.

There is only one specimen in the Bushell manuscript that is attributed by Tzu-ching to the Yuan period—this is a little vase of white ware decorated with dragons faintly engraved in the paste under the glaze.

This white ware, generally classed as Ting, is indeed in many of our books on porcelain considered to be especially characteristic of the Mongol dynasty, but I cannot find any definite confirmation of this. The finer pieces of plain white seem to be generally attributed by the Chinese rather to the beginning of the next dynasty. The little white plate in the Dresden Museum, said to have been 'brought back from the East by a crusader,' has no claim to such an early date.[39]

[38] The cobalt pigment itself, when not of native origin, was known to the Chinese in Ming times as *Hui-hui ch'ing* or 'Mohammedan blue.' The other names for the material, *sunipo* and *sumali*, probably point in the same direction.

[39] A little white oval vase, in the Treasury of St. Mark's, at Venice, may possibly be of this old Ting ware. The decoration is in low relief, and four little rings for suspension surround the mouth. In any case this is the only piece in this famous collection that has any claim to be classed as porcelain.

CHAPTER VI
THE PORCELAIN OF CHINA—(*continued*)

The Ming Dynasty (1368-1643)

IT was in the course of the three centuries during which the Ming dynasty ruled in China that the greatest advance was made in the manufacture of porcelain. When, however, we come to look a little more closely, we find that this long period may be shortened by nearly a hundred years. Before the accession of Yung-lo (1402), and after the death of Wanli (1619), the times were little favourable to the arts of peace, and even in this shorter period of two centuries there were intervals, indeed whole reigns, of which there is little to report.

The points of chief importance to remember in connection with this dynasty are—1. That not later than the beginning of the fifteenth century the employment of the oxides of copper and cobalt for decoration under the glaze was coming into general use. To this, or perhaps to an earlier date, we must assign the beginnings of the ware that we in England are wont to consider the most important of all, the great family of 'blue and white' porcelain. 2. That probably about the same time, or soon after, the 'painted glazes,' as we have called them, were introduced. In this ware the colours required for the decoration—the palette was a very restricted one—were painted directly on the biscuit, the piece having been previously fired; it was then re-fired at a moderate heat. 3. That at a later period, probably about the middle of the sixteenth century, the employment of enamel colours above the glaze was introduced, probably under European influence.

It is the blue and white that we are above all accustomed to associate with the Ming period. But this is not the Chinese point of view. If we consult the Bushell manuscript (see chap. v.) we find that Tzu-ching, towards the end of the sixteenth century, had in his collection thirty-nine pieces which he attributed to the reigning dynasty, but of these only five or six would be classed by us as 'blue and white'; at least equal importance was given to those decorated with copper-red under the glaze, and even more specimens belong to the class of painted glazes. These latter are chiefly little objects—pen-rests, rouge-pots, and small wine-jars moulded to represent plant and animal forms, the gourd or again the persimmon being great favourites. We must not confuse these early specimens, dating mostly from the fifteenth and sixteenth centuries, with the somewhat similar objects so much sought after by the French collectors in the eighteenth century, which belong for the most part to the contemporary *famille verte*; on these the decoration is given for the most part by enamels *painted over the glaze*. Still it is from some of these little *magots* that we can perhaps form the best idea of the coloured porcelain so prized by Tzu-ching, but of which we are unable to point to any specimens in our collections.

In connection with these painted glazes—for it undoubtedly belongs to this class—it may be well to say something of a very decorative ware of which the origin is probably to be placed in early Ming times. The colours are distinctly those of the *demi grand feu*, and in this ware we have the earliest instance of the use of these colours. This porcelain occurs most frequently in the shape of vases of baluster outline with contracted necks and small mouths, or sometimes of the more ordinary oil-jar shape, with wide mouths. We may distinguish two types of this ware. In the first the decoration is given by means of a low relief of beads and of ribs surrounding countersunk *cloisons*. The field between these *cloisons* is of a deep blue passing into a blue-black, and the *cloisons* themselves are filled with a wash of turquoise or straw-yellow. Chains of pearls in festoon surround the neck, and from these hang *pendeloques* of various Buddhist emblems. On the body of these vases the decoration

often consists of lotus-plants arising from conventional waves.[40] In the second type the turquoise blue predominates, an impure pale manganese is added, and the jars are often built up of an open-work trellis of bars. Both the turquoise and aubergine purple porcelain of the Kang-he period, as well as the Japanese Kishiu ware, may possibly be traced back to a Ming porcelain of this class. There are specimens of all these wares in the British Museum and at South Kensington. In the Salting collection is a jar of the *cloisonné* type, the blue-black ground covered with a skin of thin glaze of a dull surface. This jar was formerly the property of a Japanese collector (Pl. ii.).[41]

The colours applied *under the glaze* are confined to cobalt blue and copper red. The latter when fine in tint was greatly prized by the Chinese, and we are informed that in the most brilliant specimens the colour was given by 'powdered rubies from the West.' It was, however, a treacherous colour to use, and after the period of Hsuan-te (1425-1435), which was famous for its ruby-red, it fell into comparative disuse and was displaced in a measure at a later date by a more manageable iron red. The use of the copper sub-oxide to obtain a red, *sous couverte*, was, however, revived in the time of Kang-he. On examples in European collections this red, when used alone or in connection with blue, is generally of a rather poor maroon colour, and it has not found much favour with us. The colour was often thus applied to the painting of fish, floating, it may be, among blue water-weeds. We see it at its best as a monochrome on some little bowls, enlivened with a floral design in gold, in the British Museum. These cups and some similar ones at Dresden undoubtedly date from Ming times; the ruby tint seen through a brilliant glaze has never been equalled in later days. With these we may compare certain little apple-green bowls similarly decorated with gold. One of these in a silver-gilt mounting of the early sixteenth century is in the Gold Room at the British Museum (Pl. v.).

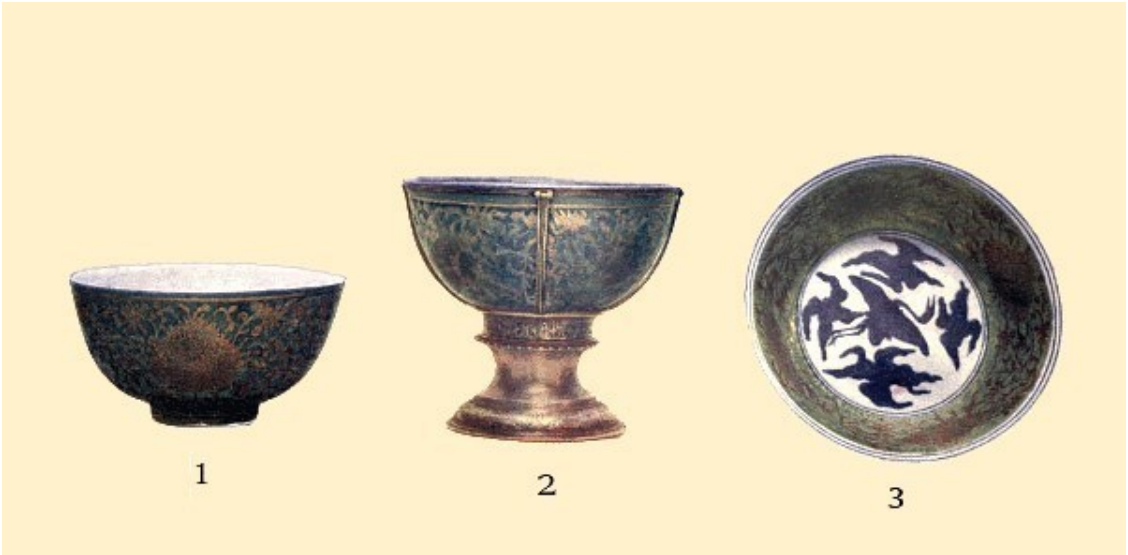

PLATE V. CHINESE

[40] The style of this *cloisonné* decoration is almost identical with that seen in the two magnificent lacquer screens with landscapes and Buddhist emblems at South Kensington. The chains of pearls and *pendeloques* are characteristic of a style of painting often found on the beams and ceilings of the old Buddhist temples of Japan. This is, I think, a *motif* not found elsewhere on Chinese porcelain.

[41] The late M. Du Sartel gives in his work on Chinese porcelain good photographs of some jars of this class in his collection. He was one of the first to call attention to this ware.

‘Blue and White’ Porcelain

What we somewhat vaguely call ‘blue and white,’ that is porcelain decorated under the glaze with designs painted with cobalt blue, has always formed the most important class in the eyes of European collectors, at least of those of England and Holland. This preference has been even more marked with the people of India and Persia, and no wonder, for no combination of colour more suggestive of coolness could be imagined. It has thus come about that this class of ware, more than any other, has been made with the direct object of exportation. This blue and white porcelain of China and Japan, which has found its way into so many lands both of Europe and Asia, has for centuries had the profoundest influence upon the native wares of these countries, whether of porcelain or of fayence.

In China, by the introduction of this process of freely painting with a brush upon the surface of the paste, the potters art was for the first time brought into contact with that of the painter, and thus fell under new influences. The artists of China at that time were divided into many schools, but what we may call the literary or *dilettante* influence was predominant, and this influence is reflected in the subjects treated on Ming porcelain—subjects which, as usual in China, were handed on to the ceramic artists of the next dynasty. The earliest decoration in blue and white in no way followed, as far as we know, the hierated types of the old bronze ware. Such *motifs* we do indeed sometimes see repeated on porcelain, but only on pieces that may safely be attributed to a much later date, especially to the pseudo-archaic revival of Yung-cheng’s time (1722-35).

There is no class of Chinese porcelain to which it is more difficult to assign even an approximate date than to this blue and white ware. We may say at once that the *nien-hao*, or the characters giving the name of the dynasty and the emperor, so often found inscribed on the base, are in the vast majority of cases of no value for fixing the date, and this is especially true when the name of a Ming emperor is thus found. What is more, these marks, as far as we can judge (from the knowledge we now possess derived from other sources), do not, as we might have expected, even help us in giving hints of the style prevailing at the period indicated by the date. To take but one example, the reign-mark of Cheng-hua (1464-87) is the one most frequently found on the finest pieces of blue and white (in the Salting collection, for instance), but by far the greater number of the pieces so marked undoubtedly date from the beginning of the eighteenth century. On the other hand, the Chinese books all agree in telling us that this Cheng-hua period was noted for a decline in the excellence of the blue, but on the other hand was pre-eminent for its coloured decoration. It was rather the earlier Hsuan-te period (1425-35) that was renowned for the brilliancy of its blue. These statements of the Chinese authorities are confirmed by an analysis of the Ming specimens illustrated in the Bushell manuscript. The Japanese, perhaps a little more rationally, give the preference to the reigns of Hsuan-te and Yung-lo (1402-24), for the date-marks of these emperors (‘Sentoku’ and ‘Yeiraku’ in the Japanese reading) are to be read on the commonest modern blue and white in domestic use in that country.

This is a point that cannot be too strongly dwelt upon. Perhaps if a little more of the care and research that have been devoted to the reading of these *nien-hao* and other inscriptions on Chinese porcelain had been earlier directed to a careful examination of the glazes and enamels, and to questions of technique generally, the misconceptions that so long prevailed as to the dating and classification of Oriental porcelain would have been sooner dispelled.

But what means have we then for settling the date of a piece of Chinese blue and white ware? What criterion is there for distinguishing between specimens of early Ming, late Ming, or Manchu times?—or indeed between those of Chinese and Japanese origin? That we even now possess no very exact criterion is shown by the wide difference of opinion so often found in individual cases. If we are to form our judgment from the rare extant pieces of blue and white known to have been imported into Europe in the sixteenth century, we must regard the Ming ware as distinguished by a certain irregularity of surface, seen best by side-reflected lights; the pieces are generally moulded, and the

marks of the lines of junction of the moulds are often to be traced on the surface; the paste, too, is generally very thick, and sometimes shows gaping fissures at the margin. The drawing of the design is somewhat hasty and summary, although at times distinguished by a freshness of handling and by a certain caligraphic freedom. But we must not draw too hasty an inference from the few specimens in our European collections, many of which must have been made, as we shall see later on, at a period of temporary decline; nor are we justified in regarding mere articles of commerce, as most of these specimens undoubtedly were, as representative of the higher artistic products of the time.

The blue in these early pieces is generally of a full tint but not of any remarkable quality. There are, however, to be found a few specimens, heavily moulded indeed and of irregular contour, decorated with cobalt blue of a full sapphire tint. Of this class there are one or two brilliant specimens both in the British Museum and at South Kensington. In these and in other Ming wares the surface of the glaze is often dulled, and this is not always the result of minute scratches, for sometimes a process of devitrification appears to have set in.[42] Another class of Ming ware is distinguished by a decoration delicately painted in a pale blue tint, and it was this style that was copied by the Japanese in their Mikawaji ware of the seventeenth century.

It is to later Ming times that we must attribute the bulk of the rough heavy ware of which so much is found in India.[43] These are generally large plates and bowls, often discoloured from having been used for cooking purposes. The decoration is hastily executed in a dull indigo blue (derived of course from cobalt, as in other cases), and the outlines are often accentuated by black lines. Many fine specimens of this picturesque ware, from the collection of Mrs. Halsey, were shown in the exhibition of blue and white ware at the Burlington Fine Arts Club in 1895. It was claimed for one large vase that it came from the palace of the Moguls at Agra, and that it had been presented to Jehangir by the Chinese emperor Wan-li (1572-1619). It is often stated that this class of ware was made at some factory in the south of China, probably in the neighbourhood of Canton, the port from which doubtless most of it was exported. As yet, however, no evidence, as far as I am aware, for such a factory has been brought forward, and no definite locality indicated. The statement made by the Abbé Raynal, about a factory at Shao-king Fu, rests probably upon a misconception.

[42] This dull surface is especially noticeable in some of the specimens with Arabic inscriptions in the British Museum; these date from the Cheng-te period (1505-21).

[43] In Persia, too, and in that country accompanied by many other varieties of Chinese porcelain. For examples of these wares see above all the collection at South Kensington.

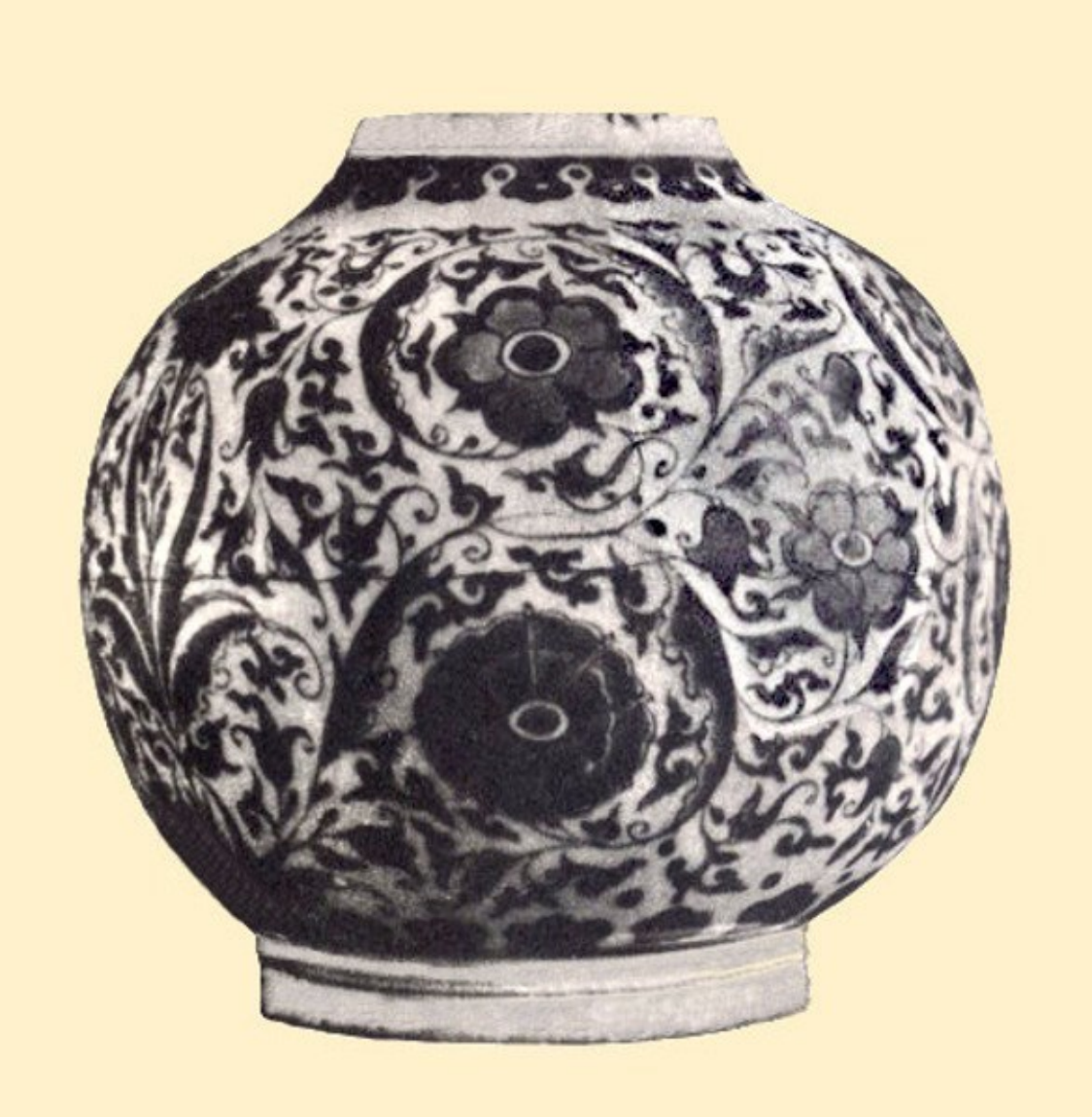

PLATE VI. CHINESE, BLUE AND WHITE WARE

There are several specimens of blue and white in England, the metal mountings of which date from the early seventeenth or even from the sixteenth century. Of these the most famous are the four pieces from Burleigh House (now belonging to Mr. Pierpont Morgan), which are believed to have been in the possession of the Cecil family from the time of Queen Elizabeth. One of these bears the date-mark of Wan-li, the contemporary of that queen. This ware is not particularly fine, the surfaces are irregular, and all the pieces are apparently moulded (Pl. xxviii.).

This subject, however, of the early presence of Chinese porcelain in other lands we shall return to in a later chapter.

So far, then, with such imperfect lights as are at our command, we have attempted to follow up the history of porcelain, and so far, say up to the middle of the sixteenth century, China is practically the only country with which we are concerned. Some fair imitations of celadon, the *martabani* of Oriental commerce, had probably by this time been made in Siam and perhaps elsewhere, and the Japanese were already in a sporadic way experimenting with imported and native clays. But up to the sixteenth century the Chinese had practically the monopoly of the art, and as we have seen they had at that time the command of three processes of decoration—that is by monochrome glazes, by

painting with glazes of a few simple colours on the biscuit, and finally by means of cobalt blues and copper reds painted on the surface of the raw paste.

Not but that some attempts may have already been made to apply coloured decoration over the glaze—the next and final step in the history of porcelain. There are some passages in contemporary Chinese books, giving descriptions of elaborate subjects painted in many colours on porcelain of the fifteenth and sixteenth centuries, which it would be difficult to apply to our class of painted glazes. Thus—to take a pronounced instance from an unexceptionable source—the miniature wine-cups, No. 59 of the Bushell manuscript, are attributed by Tzu-ching to the reign of Cheng-hua (1464-87), and he describes them thus—'They are painted in enamel colours' (so Dr. Bushell translates the original) 'with flowers and insects; … the cockscomb, the narcissus and other flowers, the flying dragon-fly and crawling mantis are minutely painted after life in green, yellow, and crimson enamel.' (This, by the way, is a combination of colours which it must have been difficult to apply at one firing with the pigments known at that time.) And yet in the absence of any specimen of enamelled ware (using the word enamel in its restricted sense for a decoration applied over the glaze) that can with certainty be attributed to so early a period, it will be safer to postpone the date of the introduction of this decoration, *sur couverte*, for another hundred years.

It will be remembered that the distinctive feature of this decoration with enamels is the use of an easily fusible silicate, containing much lead—in fact a kind of flint glass. A glass of this description is capable of being stained by the addition of small quantities of certain metallic oxides, some of which would not stand the heat requisite for the firing of the porcelain. This, in fact, is the application to porcelain of the arts of the glass-stainer and of the enameller, arts already at this time fully developed in the West. For once the Chinese authorities all agree in finding in an exotic and indeed Western art the origin of their enamelled porcelain. When, however, we attempt to interpret their statements we are landed in an even more than customary chaos—so many are the different readings for the names of foreign countries and for technical processes.

Let us then consider for a moment what the materials were that the Chinese had to draw from —whether from Arab or other sources.

Putting aside the application of stained glass to windows, for specimens of this art are not easily exported, these may be summed up as, first, the enamelled glass of the Saracens, and secondly, the *cloisonnés* and *champlevés* enamels of the Byzantines and other Western nations.

As to the first—the application of coloured and easily fusible enamels to the surface of glass, which was then exposed to a second firing—this process had been used by the Arabs for the decoration of their mosque lamps and other vessels probably as early as the twelfth century, and this was an art identical in its system with the application of the same colours to the surface of porcelain. The beauty of the effect cannot have failed to have struck the Chinese if they had had any opportunity of seeing the finer specimens. But the material was fragile, and apart from a statement by M. Scherer that glass was exported from Aleppo to China,[44] I cannot find in the accounts of the Arab trade of the time any record of such ware being imported into China.

On the other hand, we know that enamels on metal are first mentioned in the Ming annals about the middle of the fifteenth century. They take their name of Cheng-tai enamels from the emperor who reigned at that period; but the proper Chinese term for such enamels is *Folang chien yao*—'the inlaid ware of Folang.' Julien interpreted these words '*Porcelaines à incrustations (ornées d'émaux) de France*,' and Dr. Hirth carries us to Bethlehem! But the word *Folang* is probably the same as the term *Folin* or *Fulen*, used as early as the sixth century for the Roman empire of the East, and it may

[44] *Relations des Musulmans avec les Chinois.* It is not impossible, however, that further research may bring to light some information on this subject. Since writing this I hear from Dr. Bushell that some specimens of Saracenic enamelled glass, presumably of the fourteenth century, have lately been purchased in Pekin. The Arab trade with China was probably never more active than in the first half of the fifteenth century. It is with the Memlook Sultans, then ruling a wide empire from Cairo, that we must associate most of this enamelled glass, and the Eastern trade was in their hands.

possibly be connected with the Greek πόλις (cf. Stamboul = Εἰς τὴν πόλιν).[45] It is definitely stated by a later Chinese writer that the same colours are employed by both the enameller on metal and the decorator of porcelain.

If we examine the colours found on both the wares to which we have tentatively traced back the enamelled porcelain of the Chinese—the enamels on glass on the one hand, and those on metal on the other—taking in each case the earlier specimens as examples, we find on the mosque lamps from Cairo little except a deep blue generally used as a ground for a design which is outlined in an opaque iron red. On the famous flask from Würzburg, now in the British Museum, for which a 'Mesopotamian' origin of the thirteenth century is claimed, a turquoise blue relieved by gilding is the predominant note; there is also a sparing use of yellow, of an opaque white, and, what is especially interesting, of a fine pinkish red, which is possibly obtained from gold. (The way in which this colour is shaded into the opaque white reminds us of the similar use of the *rouge d'or* in later times in China.)

If, on the other hand, we turn to the earlier Chinese enamels on metal, the so-called Ching-tai vases, attributed to the fifteenth century, we find among the colours used an opaque iron red, a yellow, an opaque white, and finally two kinds of blue, a turquoise and a full deep blue that looks like a cobalt colour.[46]

Some time, then, during the sixteenth century, whether before or after the accession of Wan-li (1572), the Chinese began to decorate the surface of their porcelain with jewel-like enamels *appliqués* to the glaze. At first, apparently, these colours were confined to three: a copper green, a yellow generally of a buff tint, probably containing antimony as well as iron, and a purple derived from manganese. These are the *San-tsai* or three colours of the Chinese writers, and it will be seen that they differ from the colour triad of our 'painted glazes' (painted, that is, on biscuit and reheated in the *demi grand feu*) in that the copper silicate is of a turquoise blue in the latter, and in the former of a full leafy green. The Chinese authorities further tell us that a second scheme of decoration was given by the *Wu-tsai* or the five colours which were made up by the three already mentioned, with the addition of an opaque red derived from the sesqui-oxide of iron (otherwise known as hæmatite, bole or red ochre),[47] and finally of a cobalt blue, *sous couverte*, surviving as it were from the earlier blue and white ware, for, as we have mentioned, the use of the blue as an enamel over the glaze belongs to a later period.

So much for the teaching of the Chinese books; but when, attacking the subject from the other side, we examine the specimens of enamelled ware which for one reason or another—the coarseness and thickness of the paste, the moulded form, and the irregular surface—we should be inclined to attribute to the Ming dynasty, we are led to classify these earlier examples somewhat as follows:—

1. On a white ground a design, often, it would seem, of textile origin, roughly painted in an opaque red (like sealing-wax), with the addition of a leafy green and very rarely of a little yellow. This is a class of decoration much imitated in Japan at a later date, especially by the artist potters of Kioto and at Inuyama.

2. The same colours with the addition of blue, *sous couverte*. The design often takes the form of figures in a landscape, the whole broadly treated. The earliest type of the Imari ware (apart from the Kakiyemon) seems to be based on this scheme of decoration.

Both these classes are distinguished by the white ground, the sparing use of yellow, and the almost complete absence of manganese purple and turquoise blue.

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[45] See Bushell, p. 454.

[46] Note that cobalt as an enamel colour was not applied on porcelain during Ming times.

[47] There is, however, a curious old bowl in the Salting collection with the nien-hao of Cheng-te (1505-21), on which a design of iron red, two shades of green, a brownish purple, *and a cobalt blue of poor lavender tint, all these colours over the glaze*, is combined with an *underglaze* decoration of fish, in a full *copper red*. Note also the early use of a cobalt blue enamel, *sur couverte*, in the Kakiyemon ware of Japan.

3. A transparent enamel of leafy green, yellow and manganese purple painted on in washes so as to cover the whole ground. When with these colours we find the outline drawn in black, we have the basis of a large part of the *famille verte*. On the other hand, it is this class of decoration which probably carries on the tradition of the early Ming ware, sometimes described as 'enamelled,' but more probably all of it painted on the biscuit and fired in the *demi grand feu*.

In China it would seem that these enamelled wares were at first treated with a certain disfavour, if not with contempt, at least by the more cultivated classes. During Ming times, though porcelain thus decorated was doubtless made at King-te-chen, it was, at least up to the latter part of the reign of Wan-li, chiefly made in private factories. In fact we find a censor, in the reign of that emperor, protesting against the use of enamel colours (the *wu-tsai*) in the porcelain supplied to the palace (Bushell, p. 241).

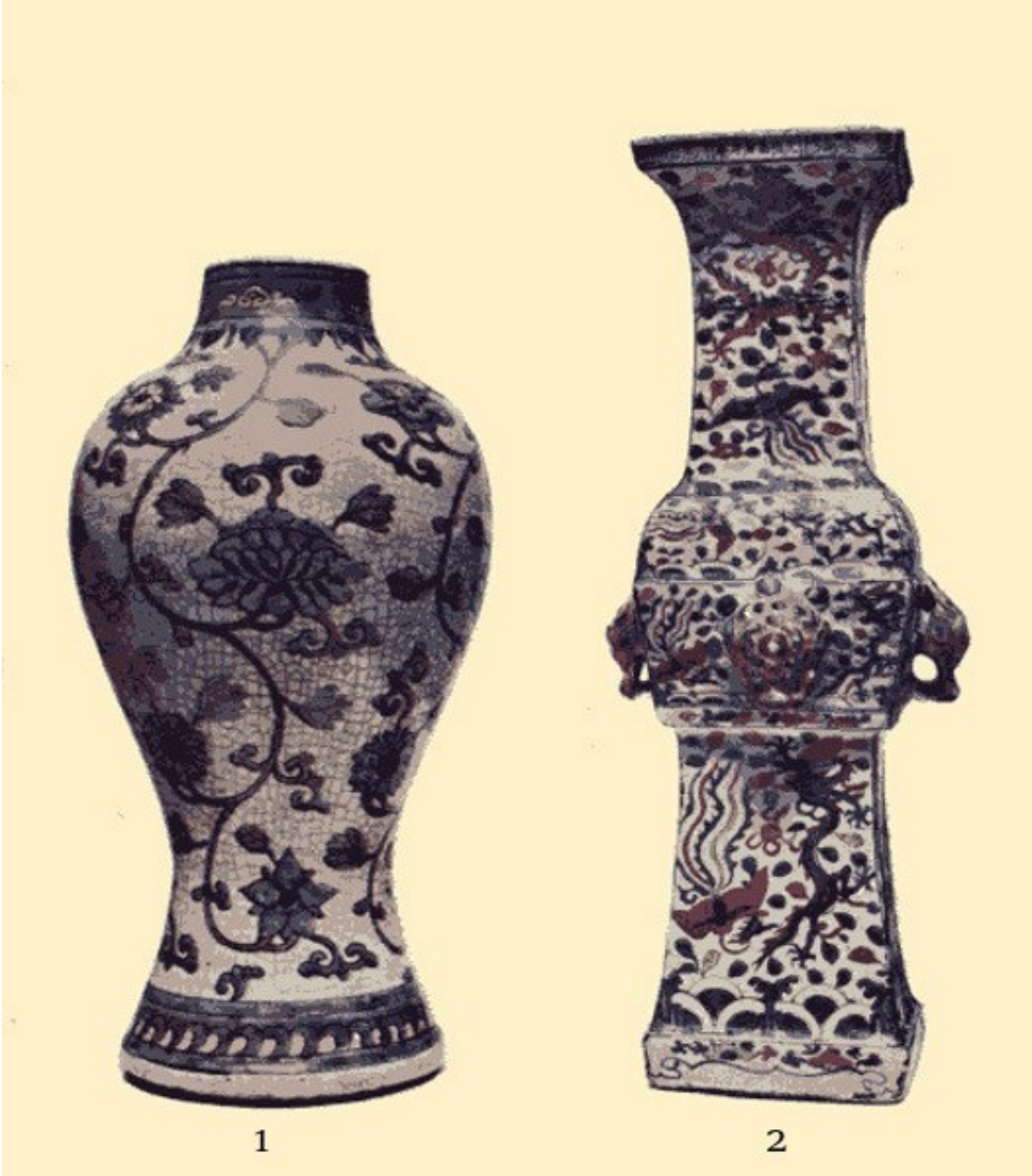

PLATE VII. CHINESE

We have now sketched out a description of the various kinds of porcelain made during the course of the Ming dynasty, and before going on at once to an account of the period associated with King-te-chen and the great rulers of the Manchu dynasty, it will be well to extract a few notes on points that may interest us from the somewhat voluminous records and descriptions of the porcelain of Ming times found in the books of the Chinese authorities.[48]

Yung-lo (1402-24).[49]—This great emperor, who sent out ships for conquest and for commerce as far as Ceylon, is for us especially associated with a white eggshell porcelain of which there are two remarkable specimens in the British Museum (see above, p. 67). Bowls of this thinness must have been pared down on the lathe, after throwing on the wheel, in the manner described on p. 22, until a mere translucent ghost of the original body was left, so that the name *to-t'ai* or 'bodiless,' by which this ware is known to the Chinese, is not inappropriate. The earliest blue and white porcelain of which there is any definite record was made in this reign, but the evidence for this is, of course, purely 'documentary.' The quality of the blue is said to have been surpassed only by that of the Hsuan-te and Cheng-hua periods.

Hsuan-te (1425-35).—The short reign of this emperor is connected in the mind of the Chinese with the finest works both of the metal worker and the potter. This period gave its name to the famous pale bronze so admired in later days by the Japanese.[50] The blue of the Hsuan-te period, unsurpassed in later times, we are told, was derived from Arab sources, for the famous *Su-ni-po* and *Su-ma-li* blues are first mentioned at this time. The word *Su-ma-li* has been compared with the low Latin *Smaltum*, the prepared silicate of cobalt used by the mediæval glass-stainers, but from the description of this substance in the Chinese books, it would seem rather to have been of the nature of a native ore. When, however, we read in the same books of the origin of the brilliant red for which this reign was equally famous, how it was prepared from 'powdered rubies of the West,' we see how little reliance we can place in their accounts. This red, derived of course from the sub-oxide of copper, was applied either to cover the whole surface, as in the little bowls mentioned on p. 81 ('painted on the biscuit,' says Dr. Bushell, but is this necessarily so?), or for the painting of a design in this case both alone and in combination with blue. We hear also of large jars and garden seats of a coarse porcelain, with dark blue and turquoise ground and decoration of ribbed cloisons, which were first made in this reign. Of this class we have spoken at length when treating of the 'painted glazes.'[51] Of what nature the decoration in five colours, which is also referred to this reign, may have been, it is difficult to say—we have no specimen so painted that we can assign to so old a period, but in this connection we certainly must not think of enamels painted over the glaze.

Cheng-tung reigned from 1435 to 1449; he was then captured by the Mongols, and during the five years of his imprisonment his brother Cheng-tai reigned in his stead. When Cheng-tung returned from his captivity he adopted a fresh name.[52] This is the only instance of a double nien-hao in later Chinese history. We hear of Cheng-tai in connection with the introduction of enamels on metal, but for the history of porcelain both reigns are a blank.

Cheng-hua (1464-87).—This is a name familiar to collectors. It is found more frequently than any other on highly finished vases dating really from the eighteenth century. Strangely enough, this is the favourite mark on the finest blue and white of this later time, although, as we have already

[48] Much of this kind was translated by Julien, and a good summary may be found in Hippisley's paper contributed to the Smithsonian Institute, but the information from the same and other sources is more accurately translated and critically analysed in the seventh and eighth chapters of Dr. Bushell's great work.

[49] Yung-lo, according to the Chinese reckoning, did not commence his reign until the new year's day following the death of his predecessor (1403). I have, however, thought it better to adopt the European method of reckoning dates.

[50] The name *Sentoku* that they give to it is the Japanese reading of the characters forming this emperor's name.

[51] We may mention that a pair of wide-mouthed vases of this ware, shown at the Burlington Fine Arts Club in 1896, bore the nien-hao of Kia-tsing (1521-66) inscribed round the mouth.

[52] More properly a *fresh name was given to the period*, but for the sake of brevity we here as elsewhere identify the emperor's name with that given to the nien-hao.

pointed out, the Chinese books tell us that, the sources of the foreign cobalt blue being in Cheng-hua's time exhausted, more attention was given to coloured decoration. This was the time of the famous 'chicken-cups,' for which such fabulous sums were given. These cups are described as decorated with the wu-tsai or five colours; and the subject painted on them, a hen and chickens by the side of a flowering peony-bush, reminds one of the enamelled egg-shell cups of Kien-lung (1735-95). The Ming cups were copied, we are told, at that time; but it is difficult to connect this early ware, of which unfortunately we possess no specimen, with the delicate enamel decoration of the *famille rose*.[53]

Hung-chi (1487-1505).—This name appears especially on the back of bowls in association with a yellow glaze of various shades, and, in agreement this time with the material evidence, the Chinese books mention this yellow as a speciality of the reign. Not that we can regard all yellow ware with this mark as even of this dynasty; like other Ming ware it was imitated in the eighteenth century. The yellow varies from the pale brown of the raw chestnut to a full gamboge tint. There is at South Kensington a dish or shallow bowl with a full yellow glaze; on the back beside the nien-hao of Hung-chi, a Persian inscription and a date corresponding to the sixteenth century has been cut in the paste.

Cheng-te (1505-21).—The decoration of blue on a white ground is said to have been revived in this reign. A new material, the *hui-ching*[54] or Mohammedan blue, was obtained from Yun-nan. In connection with this, we can point to a curious collection of bronze and porcelain, with both Arabic and Chinese inscriptions, made probably for Mohammedan Chinese. These objects were obtained by the late Sir A. W. Franks from Pekin, and are now in the British Museum. Among them there are several pieces of blue and white with the Cheng-te year-mark.[55] On one of these pieces the Persian word for 'writing-case' forms part of the decoration (Pl. viii.). It is in this reign that we hear for the first time of the oppression exercised by the court officials upon the potters of King-te-chen, and now also we find the court eunuchs in the highest positions,—the great days of the Ming dynasty are already passed.

Kia-tsing (1521-66).—The name of this emperor is often found on blue and white porcelain, and it is a favourite one with the Japanese imitators. Some specimens in our collections, of a fine sapphire blue (the colour is indeed often inclined to run), may perhaps be referred to this reign. The demands for the court were very extensive, and if we are to trust the list of articles quoted by Dr. Bushell from the Fou-liang annals, the porcelain made for the palace during this period was, with the exception of a little of that with a brown ground, confined to blue and white ware.

[53] The Trenchard bowls, mentioned below, belong probably to this or to the following reign.

[54] But this name is also applied by some to the older Su-ma-li blue.

[55] Perhaps the earliest nien-hao on a piece of blue and white in which we can place any confidence.

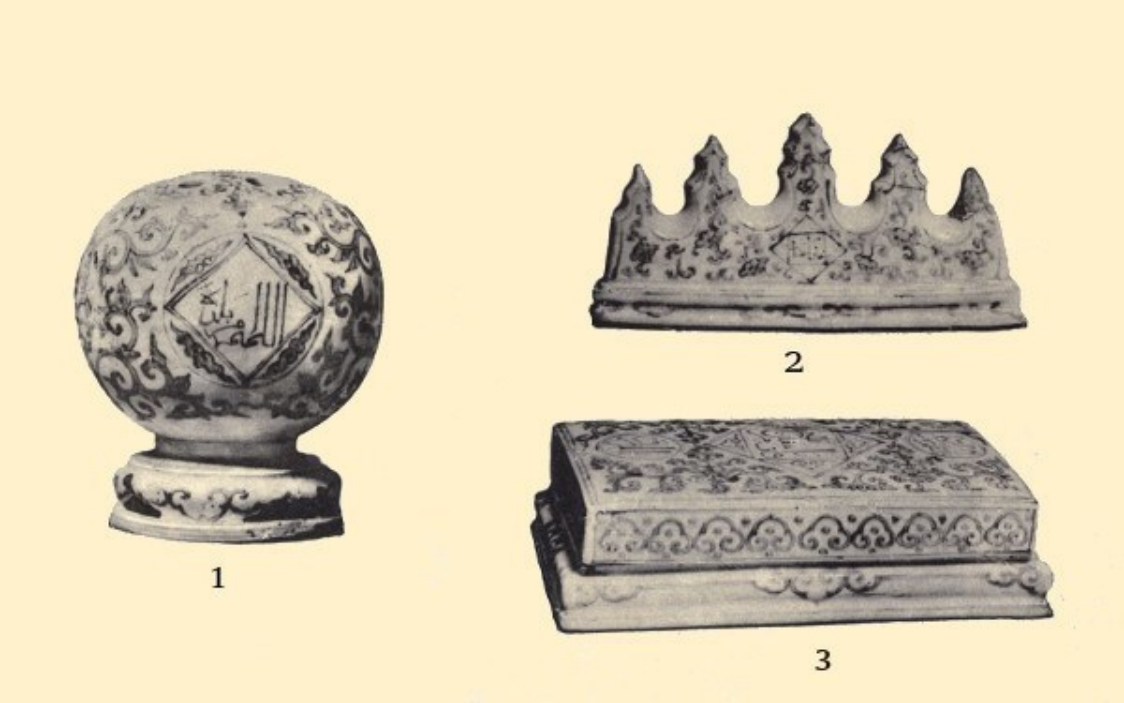

PLATE VIII. CHINESE, BLUE AND WHITE WARE

Конец ознакомительного фрагмента.