EDWARD DILLON

PORCELAIN

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PREFACE

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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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PORCELAIN

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CHAPTER I

INTRODUCTORY AND SCIENTIFIC

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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 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	58 per	61 per

		cent.		cent.		cent.
Alumina,	12	”	36	”	21	”
Potash and Soda,	5	”	5	”	5	”
Lime and Iron,	3	”	1	”	13	”

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 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