Archaeological
Institute
of America

THE CHARACTERISTICS OF EYE BEADS FROM THE EARLIEST TIMES TO THE PRESENT

Gustavus A. Eisen

[PLATE I]

THE following review of the eye beads is the result of studies made during the last five years in many museums in Italy, Switzerland and Germany, as well as in the Metropolitan Museum of New York, where the collections from the Palace of Amenhotep at Thebes and those from Lisht and other, unnamed, places were generously placed at my disposal by the excavators, Messrs. A. M. Lythgoe and H. E. Winlock, both of whom are much interested in this matter and have pointed out to me many interesting points which otherwise might have escaped my attention. The results of these excavations cannot be valued too highly, as they enable us with some degree of certainty to segregate the beads of two distinct periods which hitherto have not been separated—those of the XVIII and XIX Dynasties.

As an aid in dating excavated material beads occupy a very important place, partly because their structure and technique is different in different periods, partly because their ornamentation in no small degree corresponds with that of other objects of the same period. Hitherto the study of beads has been much neglected and has generally been considered less important than that of other objects. The main difficulty in studying beads lies in the neglect with which they have been treated by investigators who rarely have figured and described them properly. Description alone cannot make a lasting impression on the mind of the investigator. While figures in black and white might serve the purpose in some cases, those in colors alone can give us a true understanding of their appearance and nature.

A proper study of beads not only makes us acquainted with the artistic taste of those who made and wore them, but it also will help to clear many obscure points in the relationship of different nations, their trade, migrations and religious beliefs. Many investigators consider that primarily all beads were used as tal-

American Journal of Archaeology, Second Series. Journal of the Archaeological Institute of America, Vol. XX (1916) No. 1. pp. 1-27 Concld 1

ismans and amulets and that their value as ornaments was of secondary importance. The most remarkable proof of such opinions is the fact that, to this day, the peasants of Brittany possess numerous (until lately innumerable) necklaces of antique beads preserved as heirlooms from remote centuries, which now pass from hand to hand in the curing of various diseases.[1] Among these antique beads, those with the mysterious eye-spots are counted of special virtue, and it is stated that 1,000 francs could not induce the owner to part with a certain bead.

A study of beads reveals the interesting fact that many types once common and popular soon fell into disuse, but were introduced again centuries later, when they were, however, manufactured by a different technique which permits us to distinguish readily the older from the later examples. The technique of the beads is thus the most important point in their study.

Definition.—A bead is a unit of a necklace and perforated by one or several bores. A glass bead is such a unit made of glassy material, transparent or opaque, but always more or less uniform, a material that has been formed in a state of fusion. The word paste which many use to designate opaque glass, had better, I think, be employed for a material formed cold, like potter's clay. An eye bead is one ornamented with one or more spots resembling eyes, which, however, may be circular, oval, triangular or square.

Description.—The body of which a bead is made may be called the matrix and the color of the matrix the base color. In describing the matrix, mention if the glass is clear or full of blowholes, the latter being characteristic of the earliest glass beads, though such glass lasted a long time in conjunction with a more perfect kind. It should also be noted if the glass is unusually streaky; such glass abounds during the third and fourth centuries A.D., and is now met with especially in Arabic beads. In describing the colors, a color chart is of great advantage, those supplied by Messrs. Winsor and Newton answering the purpose. To state simply that the beads are "blue, green, yellow and red" conveys no information of value. Different tints are characteristic of different periods, and the color of a bead will often determine at once its age. Certain blues and greens are found

[1] Aveneau de la Grancière, *Les parures préhistoriques et antiques en grains d'enfilage et les colliers talismanes Celto-Armoricains.* Paris, 1897. Ernest Leroux.

only in the New Empire, others in the Late Empire. An intense ultramarine is characteristic of the beads of Rameses IV, as a certain pale blue was a favorite under Thothmes III. A certain deep ultramarine is found only in beads of the eighth and seventh centuries B.C. Yellows are equally characteristic of certain epochs, for instance, the pale greenish lemon and the deep orange of the latter part of the Roman Empire, but especially of the Lombard beads. The fine "rose dorée" appears only during the Ptolemaic-Roman time, while the intensely bright emerald green can be called characteristic of the beads of the sixth century A.D.

Equal importance attaches to the different types of ornamentation. The straight bands appear on glass beads during the XIX to XX Dynasties. The "Wave" band around the girdle of the bead does not appear before the eighth or seventh century B.C., and becomes common in the fifth century B.C. The links, consisting of two wide waves which cross, appear first in the fourth and third centuries B.C., but disappear to return during the latter part of the Roman Empire.

The circular round spots on beads, if not prominent, may be called spots or circular dots, but if prominent had better be called "eyes." They may be simple, or surrounded by rings, the widest of which may be called a zone.[1] Beads of this interesting pattern have been described as "variegated beads in blue, yellow, and white"!—a singularly unfortunate description, as incorrect as it is misleading.

Technique.—The technical construction of a bead is of the highest importance, for it varied during different periods, especially as regards eye beads, as will be described in detail later on. Flinders Petrie was perhaps the first to point out that the earliest glass beads, about 1400 B.C. to 600 B.C., were laid over a wire and that in separating them from the rod their ends were drawn out to a short nib.[2] Later on the ends were cut off by beating, or the beads were made from cut rods or moulded, and yet later they were made from blown glass, all of which methods are of importance to describe. The size of the bore is of the highest importance, because the old Egyptian beads, especially the eye

[1] Flinders Petrie refers to such beads as the "aegis of Bast." (*Hyksos and the Israelitic Cities. Brit. School of Archaeology.* London, 1906, pls. XIX E and XIX A.)

[2] *Tell el Amarna*, figs. 53–61. Pl. XIII. London.

beads and the melon beads, are only, or principally, distinguished from similar beads of the period from the ninth century B.C. to the third (?) century A.D., by their narrow bore, the latter beads having an enormously wide bore. At the end of the Ptolemaic empire, new technical discoveries were made—mosaic or the millefiori process—and soon employed almost exclusively. As an instance of the importance of observing details, I will only mention one instance connected with the millefiori process. Among the beads of the Palace of Amenhotep are some of a cylindrical shape, one end being capped by a ring of different colored glass, generally yellow, while the base color is deep blue. Somewhat similar beads of slightly different colors are very common in Egypt, and are found in all collections. In museums they are generally classed with the beads of the XVIII–XIX Dynasties. In examining a large collection of many hundred beads of this kind, I found one bead which had impressed on it a fragment of a minute pattern of mosaic glass. This at once revealed the fact that this large class of beads must be dated later than the first century B.C. and probably later than the first century A.D. I placed them in the second century A.D., on account of other characteristics. Later I discovered that Flinders Petrie had already mentioned these beads. In *Hyksos and the Israelitic Cities*, pl. XLVII, fig. 198, p. 60, he says: "brings this cemetery down to the first and second centuries A.D.," without, however, referring to these beads in particular. There was thus more than one kind of evidence to date these beads with considerable correctness. The same experience was had with the type (PLATE I, Fig. 63) in which the peculiar blue of the base would classify it as old Egyptian. As a rule the eye-spot in this type consists of a simple dot, but one bead of a lot of fifty possessed an eye-spot made of a fragment of mosaic glass. These beads were then placed, also for other reasons, in the middle of the fourth century A.D., and this date was later corroborated in another way.

EYE BEADS. *Classification of Types.*—The only manner in which eye beads can be classified is according to the technique employed in producing the eyes. This is the only classification which shows a chronological sequence, the only one useful to the student of archaeology. Before entering upon details it may be well to describe the eyes first in a general way for the benefit of those who do not wish to make the study of beads a specialty.

Simple Eyes.—The eye consists of a single drop of glass or

other material, more or less deeply pushed into the matrix (Figs. 5–11). It is sometimes possible to determine whether the eye-spot is the result of a semiliquid drop of glass, or whether it was produced by pressing a cut or broken fragment of glass into the soft matrix. The fragment generally shows sharp irregular corners. The eyes in Figures 5 to 11 were all made of drops.

Painted Eye-Rings.—The earliest type of eyes found on clay or paste beads. The rings were evidently produced by pressure and filling in with pigment. In Asia Minor, Greece, and Italy spindle whorls of clay often possess rings produced by impressing a coil or twisted thread or wire into the soft clay before firing. The coil left a pattern which is both ornamental and characteristic. The Egyptian beads of this kind with painted eyes date apparently from the XIX Dynasty (PLATE I, Figs. 1 to 4).

Inlaid Coils.—The eye spot is produced by a drop of glass, but the eye ring or rings by pressing a single or composite coil of glass into the matrix, the coil forming the ring. The earliest seem to date from the XIX Dynasty. Such beads continued to be made until the time of the Ptolemies, when the process of cut off rods was invented, or came into use (Text, Fig. 1; PLATE I, Figs. 29–35, 38, 45–47).

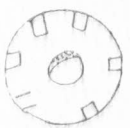


FIGURE 1.—BEAD WITH INLAID COIL[1]

Stratified Eyes.—The eyes are produced by placing upon the matrix a drop of glass and rolling it in while the matrix is soft. On top of this zone another drop of a different color is placed and similarly rolled in. When the eye has received as many superposed drops as required, the sides of the cone are ground off in order to permit the lower layers to appear on the surface as rings. If, however, the drops have been properly graded from larger to smaller, the grinding off is not necessary. In some instances it appears that the whole eye was made separately and then pressed in the bead matrix (Text, Fig. 5; PLATE I, Figs. 40, 41) or the whole bead was made up of several shields of such superposed drops, previously ground off. Such eyes date from the time of the XIX

FIGURE 2.—BEAD WITH STRATIFIED EYES[2]

[1] Cross section of a bead of the eighth century B.C., with three rings produced by pressing a simple coil into the matrix which forms the eye-spot. The square small fields are cross sections of the coils.

[2] Cross section of a stratified eye bead with four eyes, showing the saucer-like appearance and positions of the layers. The central black is the eye-spot.

Dynasty and continued in use until the time of the Ptolemies, after which time the process fell into disuse, the process of cut off rods having been invented, which permitted the artisan to produce eyes with greater facility and with less skill (Text, Figs. 2, 5–18; PLATE I, Figs. 54, 56–59, etc.).

Dipped and Cut Off Rods.—This process first appears in the fifth century B.C., but did not become common until the last part of the first milennium B.C., after which time it superseded the stratified process entirely. A rod of glass was dipped in successive baths of liquid glass of alternating colors, and, when cool, hacked off into disks, each disk forming a ready made eye which had only to be pushed into the soft matrix of a bead to form an eye with rings (Text, Fig. 3; PLATE I, Figs. 55, 60–64). Of this process we have two distinct types: one in which the eye consists of a central spot surrounded by one or more rings (Text, Figs. 3, 4), and one in which the eye is more complex, surrounded with rings, dots, bars, etc., produced by a number of rods having been fused into one. This is the millefiori process proper. This process is the one used to this day.

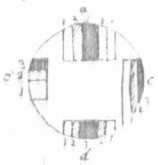


FIGURE 3.—BEAD MADE WITH CUT OFF RODS[1]

FIGURE 4.—VIEW OF ROD[2]

DETAILED DESCRIPTION. *Painted Eye-Rings* (PLATE I, Figs. 1–4). This type is principally confined to paste beads of the XVIII Dynasty, at least I have been unable to date any earlier. One bead is from the Palace of Amenhotep, but none was found in that of Kuenaten at Tell el Amarna. They are thus older than the eye beads of glass, and it appears probable that the latter resulted from an endeavor to produce eyes with rings on glass beads similar to those produced so readily on paste beads by a simpler method. The latter method is, if I am correct, thus slightly earlier. In general the beads are monochrome, shades of the blue and green characteristic of the period, the impressed rings having been filled out with pigment slightly deeper in color, but of the same shade as the matrix. The only bead known to me of this kind consisting of two colors is one in the Archaeo-

[1] Cross section of an eye bead, the eyes produced by cut off rods. *a* and *b* are perfect eyes, the left *c* is a mere chip, cut off diagonally, while the one to the right, *c*, is cut off longitudinally, thus appearing on the surface as parallel bars.

[2] Exterior view of a rod used to produce eyes, the rod being cut off in thin slices, each slice producing an eye with rings.

logical Museum of Florence, Sala VII (no number or date). This bead is white, with the eye-spots and rings blue-black or black. It is strung in connection with beads of uncertain date probably derived from different finds, like almost all the necklaces in this collection, procured from or donated by private collectors. I think this bead can be dated to the XVIII Dynasty. The artistic expression of these beads is simple and charming, more soft and harmonious than the eye beads of glass with their gaudy colors, which, seen at a distance, are, however, more effective and striking. Similar beads of paste are common in Egypt, and tourists must have carried away innumerable specimens, all private collections containing many.

Earliest Glass Beads.— In his work on glass, Kisa[1] states: "how far back these glass beads date is not to be precisely determined, but anyhow they go back to the XII Dynasty." There is no evidence that this is correct, and so far as I know there are no glass beads as early as that dynasty. The very remarkable collections of beads and other material excavated by the expedition of the Metropolitan Museum, in tombs of the XII Dynasty, contain not a single bead of glass. Kisa himself (p. 120) states that the earliest dated glass beads are those two with the cartouche of Queen Hatshepset.[2] One of these is pale blue and now in the private collection of Professor Wiedemann in Bonn; the other is of a dark or blackish green glass, now in the British Museum. Upon this latter some doubt has been thrown, some claiming that it was not of glass but of obsidian. Kisa, however, says that chemical examination has decided in favor of glass. These two beads, both with the Queen's cartouche engraved, are also the oldest glass beads known with certainty. If glass had been known before the time of Queen Hatshepset, it seems probable that it would have reached a greater development in her time than is indicated by these two beads—one pale blue, one dark or black-green—with the queen's name. In the time of Amenhotep III, glass beads had, however, reached a great perfection. The collection made by Messrs. A. M. Lythgoe and H. E. Winlock in the Palace of Amenhotep at Thebes contains magnificent specimens of glass beads, but, though they are of

[1] Anton Kisa, *Das Glas im Altertume.* Hiersemanns Handbücher, Vol. III. Leipzig, 1908.

[2] The Hatshepset beads were first described and figured by J. Gardner Wilkinson, *Manners and Customs of the Ancient Egyptians*, Vol. II, p. 141. London, 1878.

brilliant colors and made with great technical skill of fine, hard glass, their ornamentation is devoid of rings, bands, or eye-spots, so characteristic of a later period.

Beads with Eye-Spots. Eye Beads.—These beads, as has been stated, can be divided into three classes according to the technique used in producing the eye. Fortunately these processes follow each other in chronological order, and, once the technique is understood, a clear idea of their chronology is possible. The earliest beads with eyes can be divided into two series according to the presence or absence of eye-rings. Simple eye-spots, and beads surrounded by rings, continued to be in use at the same time, but of the series with eye-rings we can conveniently separate two types. One is simple, the eye being surrounded by one or two wide rings, the other is more complicated, with alternating rings in different colors, generally characterized by the narrowness of the rings. The simpler type appeared shortly after the appearance of the eye bead, the latter type developed later. It is of importance to determine the earliest appearance of each type or series.

Simple Eye-Spots.—The earliest eye beads of this kind seem to be those mentioned by F. L. Griffith (*Tell el Yahudiyeh*, Egypt Expl. Fund, Mem. 7, London 1890, pls. XV and XVI, p. 47). They are described as "glass beads, variegated yellow, white and blue with red eyes." Some of these from tumulus IV, 8, were found with a glazed steatite scarab of Ra-men-Kheper or Thothmes III (XVIII Dyn.). Other beads from tumulus IV, 2, are described as "beads of glass, opaque blue and greenish white (?) with red eyes." Found with a scarab of Rameses III (XX Dyn.). These two sets of beads appear to be similar. On page 48 of the same paper, we read: The general result of these excavations in the tumuli is to show that they belong to the XX Dynasty at least as early as the central period. Out of the first seven tumuli, there is nothing certainly later or earlier than this—the scarabs of Rameses III and IV tend to fix the date. The scarab of Thothmes is thus disregarded.

The next description that we have of the earliest eye beads is that of Flinders Petrie (in *Illahun*, London 1891, pl. VIII, fig. 10). This is a bead of mixed eye-spots and twisted threads and was found with a scarab of Rameses II (XIX Dyn.). This bead has apparently some eyes with rings, while others are simple. It is the earliest eye bead known.

In *Ehnasya* (Flinders Petrie, *Ehnasya*, Egypt Expl. Fund, Mem. 26, London 1905, pl. XL, fig. 16, p. 34), Petrie figures two beads with black base and white spots, some of which are divided by bars, which do not reach to the bore openings. They are exactly like the one on PLATE I, Figure 5, of this paper. His description reads: "In one case a reed mat was underneath the body, and the black and white glass beads with the carnelian ring on pl. XL, fig. 16, were with another. These beads are of the styles made during the reign of Thothmes III." Had these beads been so early, samples of them would undoubtedly have been found in the Palace of Amenhotep at Thebes or in Akhenaten's city of Tell el Amarna. As none were found in either place, it seems probable that those mentioned by Griffith and Petrie in connection with Thothmes III were not made in his reign and that the scarab with his cartouche was one of the common commemorative type bearing his name but made after his death. The eye-spots of these beads are perfectly circular, with even margins, which could hardly have been attained in the first efforts to make beads. As the origin of the type is to be looked for after the Tell el Amarna period, no earlier date can be assigned to these beads than the XIX Dynasty.

Fortunately for our knowledge of the earliest types of these beads, the Metropolitan Museum contains a magnificent collection of glass beads excavated at Lisht by Mr. Mace and his collaborators. I was permitted to arrange these types, and the result has been most instructive, revealing a number of varieties of eye beads, the chronology of which has until now been in doubt, while the beads themselves have never been properly figured or described. The principal varieties are seen on PLATE I, Figures 5–41. It will be seen that in this collection are a few beads of the types described by Petrie and Griffith in connection with the Thothmes scarab (Fig. 5), but which, in conjunction with the others, can be referred to the XIX Dynasty, or if we follow Griffiths' summary on page 48 (*Yahudiyeh*), to the XX Dynasty. In all these beads with simple eye-spots, these latter are all arranged in a single row around the equatorial of the bead. The Murch collection in the same Museum contains a number of similar types, which undoubtedly belong to the same period as those of Lisht. The two collections seem to give us a fair idea of the eye beads of glass from the best Egyptian period. Especially interesting for the chronology are those on PLATE I,

Figures 25 and 39. They are identical with those described by Petrie (*Meydum and Memphis*, III, Brit. School. London, 1910, pl. XXVIII, figs. 129–132, p. 37), "yellow and black beads and scarab of XIX Dynasty."

Single eye beads of white base with blue, yellow, and red eye-spots continued to be made much later (Woolley and Maciver, *Karanog*, Univ. of Penn. Publications, Pt. 40, No. 7843, 7906. Philadelphia, 1910). These are assigned by the authors to the first and second centuries A.D. Eye beads with single spots are remarkably rare in the Italian tombs of the ninth to the fifth century B.C. They are in use again later in the Lombard or Merovingian beads during the sixth century A.D., as can be seen, for instance, in the Museo Nazionale, Rome (from Castel Trosino, Nos. 65–68, etc.), or in the Stuttgart Historical Museum, Case 31 (from Alb). These latter beads are wonderfully similar to those of the XIX Dynasty, like those figured on PLATE I, Figure 6. Simple eye-spots became once more common during the Renaissance, or after the time of Marco Polo, when the Venetians began to manufacture beads for the oriental nations, etc. Witness, for instance, the innumerable beads found in comparatively modern tombs of the natives of Africa and America.

Inlaid Rings.—Before we consider the eye beads with eye-rings, it will be necessary to note the type of ring, produced by simply impressing a ring or coil on the bead either around the eye-spot, or isolated. In the former the effect is an eye with rings, in the latter we rarely find more than one ring, the matrix of the bead forming the eye-spot. These beads can be conveniently considered under two distinct series: one in which the eye-ring is produced by a twisted coil of glass threads, and one in which we have an eye-ring made of a single, thicker glass thread. The former is illustrated on PLATE I by Figures 29–32, etc., the latter by Figures 45–47. The former is rare in collections, but the latter is very common, especially in Italian tombs.

Inlaid Coils (Text, Fig. 1, PLATE I, Figs. 29–32, 33, 34, 35, etc., 45–47).—Eyes produced by a combination of simple eyes and inlaid coils are contemporary with those of the XIX Dynasty made by stratification alone. Such eye beads are among the most beautiful as well as the most complicated of all beads. The finest I have seen are those of the Murch collection, Figures 29–32, which can be dated, I think, with certainty to the time of Rameses II. The coil used in producing these eye-rings

consisted of twisted threads of glass of two distinct colors, generally blue and white, or black and white. They were sunk in the matrix around the eye, and are generally characterized by the ends of the coil not meeting, sometimes stopping some distance from each other, sometimes overlapping (PLATE I, Figs. 35, 38). The effect is rich and as beautiful as the process was difficult, requiring much care in execution. The earliest mention of such beads is by Flinders Petrie (*Illahun*, London 1891, pl. XVIII, fig. 30): "black, with blue pattern. Eye beads, black, white, and yellow common." The description does not refer to the structure and does not accentuate the appearance of the bead, but a glance at the figure shows it to be of the same type as those in the Murch collection in the Metropolitan Museum, a twisted coil of glass, with minute eyes on each side, and a rim of a twisted coil around the bore of the beads. Petrie's beads were found with a scarab of Rameses II. Beads with such coils, but without eyes, are found in the Lisht collection excavated by Mr. Mace. The Murch collection, however, makes us acquainted with many varieties, the base of which is pale blue (PLATE I, Figs. 29–30) or pale lemon (Fig. 32) or bright orange (Fig. 31), while the coils are made up of black, white, and blue threads (Figs. 29–34, 35, 38). Another type consists of sherry-colored base, with twisted threads of black and white, or brown and white. This pattern does not seem to have lasted long, and I do not know of any later than the XIX–XX Dynasties.

The Egyptians of this period also employed twisted glass threads in making the rims for glass vessels, a practice revived by the makers of mosaic and millefiori glass during the early part of the Roman Empire. During the third and fourth centuries A.D., the twisted thread ornament came once more into vogue, and beads with such ornaments are well represented in the Metropolitan Museum. The color of these beads of the fourth century A.D. is generally fine, but their technique is clumsy, the eye-spots ranging from microscopic minuteness to unusually large size. The Venetian glass-makers have made use of such inlaid coils since the time when they began to make beads, and some of their earliest beads are now sometimes found as intrusions in antique collections, as, for instance, in the Corchiano collection in the Museo Etrusco in Rome, and are generally dated from the fifth century B.C. One of the

best necklaces (XIV, No. 6036-6055) contains a bead, the second, left from centre, with eyes of dark green, eye-rings white. The rings consist of three twisted threads which are so carelessly impressed on the eye-spot that they extend over on the matrix of the bead. This technique was not used in connection with eye beads of the fifth century B.C. Searching the records of the necklace, Dr. Giglioli found that it had not been excavated by the Museum authorities, but had been purchased from a dealer, Sr. Benedetti, September 24, 1894. By a fortunate coincidence, a few weeks afterwards, I discovered in the Linden Museum in Stuttgart, an exactly similar bead, of the same color and technique from Ashanti, and of undoubted Venetian make. The two beads resemble each other sufficiently to warrant the belief that they were actually made by the same artisan.

Eye-Rings of Single Thread.—Beads, generally of a pale dull blue, sometimes blue-gray or blackish, are found in Italian and Syrian tombs of the ninth to the fifth century B.C. They are especially common in the eighth century B.C. A necklace in the Museo Etrusco, at Rome, from Falerii, XXXII, is found with a scarab of Pharaoh Piankhi (about 766 B.C.). Nearly all the necklaces in this collection contain numerous Egyptian paste beads, which would indicate that intercourse with Egypt was lively during that time. Still it is doubtful if these blue beads, with the eye consisting of a simple glass ring pressed into the matrix, could possibly have been manufactured in Egypt. These pale blue beads are so common in Italian tombs of this century that almost every Italian museum contains thousands. The beads are irregular and so badly made that the rings have frequently dropped, leaving a cavity in place of the glass filling. Most of these beads have two or three eyes (PLATE I, Figs. 45–47).

Beads of another type, larger in size, finer in color, and better made are found, but scarce, in the same tombs. Their color is often intense ultramarine blue, and the inlaid rings mostly deep yellow chrome. The Italian authors refer to both classes of beads as "turchino" without considering the distinct differences in shade and quality. One of these beads is Figure 48, PLATE I. This fine type of bead was perhaps made in Egypt. They have been described by Giovanni Lanza (*Lazio*, Rome, 1905, pl. XIII, fig. 10), and by almost all investigators who have occupied themselves with Etruscan archaeology.

Stratified Eye Beads with Rings.—The technique of these

beads has already been described in the beginning of the paper, page 5. Text Figures 2, 5–14 all illustrate the type. The whole construction of the eye can be compared with a set of differently colored saucers, of different sizes, the largest of which are at the bottom and the smallest at the top. The invention of this method caused a veritable revolution in the production of beads, and the method undoubtedly soon became very popular. There are no beads with stratified eyes in the collections from the Palace of Amenhotep, none from the city of Akhenaten at Tell el Amarna. In the excavated material from Lisht, stratified eye beads are numerous, and many are found in the Murch collection. The type continued to be made until the fourth or the third century B.C., but was about that time superseded by the technique of cut off rods.

5[1] 6[2] 7[3] 8[4]

FIGURES 5–8.—STRATIFIED EYE BEADS

There are two distinct classes of this type of beads. One is represented by the Lisht beads (PLATE I, Figs. 17–39). This type is the earliest, dating from the XIX Dynasty, or if we follow Griffith (*Yahudiyeh*, p. 48) from the XX Dynasty. As regards the chronology, the same arguments can be used as in the discussion of the single eye beads (pp. 5 to 10), and need not here be repeated. The other class is represented by Figures 40 to 54. The latter differs from the former in having the eyes approximated, or in rows frequently surrounded by many rings, of various colors. The eyes of this type more truly resembled real eyes than did those of the former type. The first to describe these beads

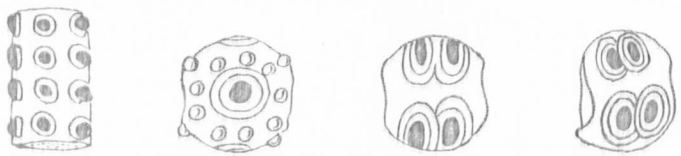
[1] Surface view of a stratified eye bead, the eyes consisting of shields, four of which have been used in building up the eye. XXII–XXIII Dynasties, Egypt.

[2] Surface view of a stratified eye bead with six eyes, three of which are represented. Fifth century B.C.

[3] Lopsided eye bead with stratified eyes, two of which are shown. The larger eye caused the matrix to extend. Fifth century B.C.

[4] Surface view of a stratified eye bead with five rows of eyes. Fifth century B.C.

was Flinders Petrie (*Hyksos and the Israelitic Cities*, London, 1906, pl. XIX, and *Meydum and Memphis*, London, 1910, pl. XXVII, figs. 129 to 137). But before entering into the details of the chronology it will be well to point out that these beads were made by two different processes of stratification. In one of them the eyes were built directly on the matrix of the bead and rolled in (PLATE I, Figs. 43, etc.); in the other the eyes seem to have been made separately like shields, several shields composing a bead with no other matrix than a core. The former process is represented on PLATE I by Figures 50 and 51, etc., the latter by Figures 40 and 41. The lines on the bead show clearly where the eyes join (Text, Fig. 5). There is no bead matrix visible, and if there is any, it is hidden below the shields.



9[1] 10[2] 11[3] 12[4]

FIGURES 9–12.—STRATIFIED EYE BEADS

Beads like those illustrated on PLATE I by Figures 40 and 41 are undoubtedly much earlier than those of Figures 50 to 53, and possibly earlier than that of Figure 42. The chronology of eye beads is of very great interest for the reason that the greatest number are found in Italian tombs of the fifth century B.C., being singularly absent from the tombs of the preceding centuries. If these beads are found in Egypt at an earlier date, we must in some way account for their absence in Italian tombs of the eighth and seventh centuries B.C. Three explanations are possible. (A) Petrie dated his beads too early, and the Italian beads are dated too late. In this case the Italian and the Egyptian beads might be of the same time, and from the same factories perhaps, as it is probable that they were all made in Egypt. (B) The

[1] Stratified eye bead, cylindrical form, eyes projecting and in rows. Fifth century B.C.

[2] Surface view of eye bead with stratified eyes and knobs. Fifth century B.C.

[3] Stratified eye bead with paired eyes. Fifth century B.C.

[4] Stratified eyes, in pairs. Bead lopsided. Fifth century B.C.

Egyptian beads were discontinued during two whole centuries. This is not probable, though I think that Petrie has somewhere expressed such an opinion, though I cannot now lay my hand on the record. (C) The communication with Egypt was interrupted during the eighth and seventh centuries B.C. This again seems improbable, because we find in the tombs of Veii and Falerii, near Rome, innumerable Egyptian paste beads, dated by the scarab of Piankhi, and entirely similar to the degraded type of paste beads of that time in Egypt; and in all these tombs of Etruscan times there are no beads similar to those described by Petrie (PLATE I, Figs. 40, 41), and very few, if any, like those of Figures 50, 51, 54.

We will now see what Petrie says upon this subject (*Illahun*, London 1891, pl. XXIX, figs. 52, 53); these being beads similar to the one figured on PLATE I, Figure 42. Page 26 he says: "The glass beads of plain colors have just vanished; and the eye beads of the Ramessid time (pl. XVIII, fig. 30) have turned into a rather scarce class of blue eye beads, with fine veins of brown and white around the eye (pl. XXIX, figs. 52, 53)." This is under the heading of the XXII Dynasty. In *Meydum and Memphis*, London, 1910 (pl. XXVII, figs. 129 to 137), in regard to a bead No. 135, he says: "The eye bead 135 is white with blue spots, a brown ring around them and a green wavy line." This bead is under the heading of the XIX Dynasty. Petrie's figure 137 resembles my Figure 43. Of this he says, page 37: "A bronze ring and a green bead with blue spots surrounded by goldy-brown lines and white." Such beads are well known, especially in the Delta, where they are dated to the XXIII Dynasty. In *Hyksos and the Israelitic Cities* (Brit. School of Archaeol., London, 1906), Petrie, pls. XIX and XIX A, figures a small number of these beads. The tops of the plates are marked XXIII (?) Dynasty. The beads of Petrie's figure 66 are less like our beads, having three eye-rings in a row, but those under figure 307, eleven in number, seem to resemble exactly my Figure 42. These are from Yehudieh. Pl. XXXVI, from Tell er Retabeh (Raamses), contains two beads, one of which resembles my Figure 42, the other Figure 47. Both are marked "about XXIII Dyn." If I interpret correctly these opinions, set forth at different times by Petrie, it would seem that he wishes to date these beads not earlier than the XXII Dynasty and possibly later than the XXIII. This brings us down to the middle of the eighth century

B.C. All these varieties mentioned by Petrie seem to be of one type, blue eye-spots surrounded with brown rings. In Italy not one of these beads has been found earlier than in the fifth century B.C. See, for instance, the Barberini collection in the Museo Etrusco, Rome; also in the Mariano Rocchi collection from Perugian tombs.

The earliest glass beads with stratified eyes found in Italian tombs come from the "Tomba della straniera" at Vetulonia, and are now in the Museo Archeologico at Florence. The bead is represented on PLATE I, Figure 43, and requires no further description. Two scarabs near by seem to be of the XXII or XXIII Dynasty. But beads of this type are so rare in Italian tombs, that I know of few that can be dated to the ninth or eighth century B.C., with certainty. A bead like Figure 50 but with smaller bore is exhibited in the Museo Etrusco, Rome (under XXXIX, 3965, Falerii), together with beads of the eighth century B.C. Another tomb find near by (Falerii, No. XXXII, No. 4186) contains 23 eye beads similar to Figures 45, 46, 47, 51, 53, 54 of PLATE I. The pendents in this necklace are like some of the eighth and seventh centuries, but the beads resemble those of the Italian tombs of the fifth century B.C. Both of these finds are thus doubtful, though they tend to show that these beads or bead types appeared earlier than the fifth century B.C. The latest dated eye beads with stratified eyes come from the fourth century B.C. (Fig. 57, from Priene, in Asia Minor,[1] which cannot be dated earlier than 390 B.C.). Of the eye beads of the third century B.C. of similar types I have no record. Those from Zollikofen, in the Berne Museum, are of a distinctly different type.

Distinct Types of Stratified Eye Beads.—There are many different types, but it frequently happens that several are used together on the same bead. The following are most readily distinguished.

A. Eyes separated and placed in a single row around the equatorial of the bead (PLATE I, Figs. 12–25; Text, Fig. 6).

B. Eyes in two rows, sometimes approximated so as to resemble animal eyes (Text, Fig. 12; PLATE I, Figs. 50, 51, 53, 54). Sometimes alternating (Fig. 55), having three eyes at one pole and four minor ones at the opposite end.

C. Eyes relieved by interspersed knobs (Text, Figs. 10 and 15).

[1] Private collection of Prof. Dr. Paul Wolters in Munich, who kindly permitted me to make a copy.

Some of these beads are cylindrical (Fig. 15), others spherical (PLATE I, Fig. 52; Text, Fig. 10).

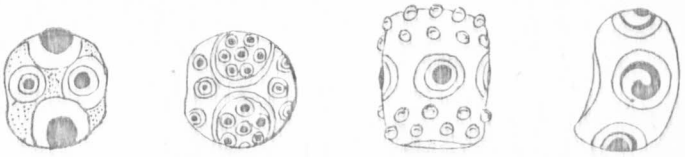
D. Eyes placed in many parallel rows (PLATE I, Fig. 54; Text, Fig. 8).

E. Eyes small, placed in groups on a specially colored, most generally brown, field (PLATE I, Figs. 55, 56; Text, Fig. 14). Fifth century B.C.

F. Eyes rather simple, strongly projecting. Bead generally square. Plate I, Fig. 49, view from the side. Appears confined to the eighth century B.C.

G. Two kinds of differently colored eyes alternating. One set paired, the other in a single row (Text, Fig. 13). Only known from the fifth century B.C.

H. Eyes small, elevated like knobs, placed in parallel rows running from pole to pole, the bead being cylindrical (Text, Fig. 9). Fifth century, B.C.



13[1] 14[2] 15[3] 16[4]

FIGURES 13–16.—STRATIFIED EYE BEADS

J. Bead made up of two or three three-cornered beads, with strongly projecting eyes, the latter being in the corners of the beads. Characteristic of about the third century B.C. (PLATE I, Fig. 59. Text, Fig. 17 is a single eye-knob.)

K. The eye or eye-spot is formed of a comma pressed on a stratified shield. This type occurs in two widely separated periods: the XIX Egyptian Dynasty and the fourth and third centuries B.C.

[1] Surface view of stratified bead, type G, described above. Two of the eyes are black and yellow, while the smaller eyes are blue and white. Fifth century B.C.

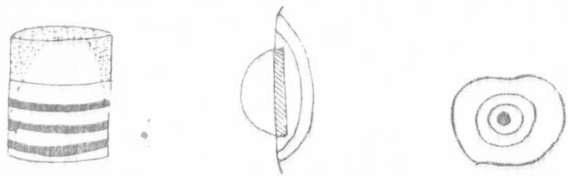
[2] Stratified eye bead, with two classes of eyes, one isolated, the other in sets of seven in a shield of white and brown, all produced by stratification. Type E.

[3] Cylindrical eye bead, stratified. The knobs arranged in rows at the ends. Fifth century B.C.

[4] Stratified eye bead, with comma eyes. Fourth to third century B.C. Type K.

L. Gold-glass eyes. The central eye-spot is made up of gold glass. These seem to belong to the third and second centuries B.C. (PLATE I, Fig. 58. Text, Fig. 18 shows a section of an eye.)

Considering the manner of the technique we can add another type or two according to the width of the bore. The earliest eye beads of the type referred by Petrie to the XXII–XXIII Dynasties, appear, if I may judge from his drawings, as well as from specimens from Egypt, to possess a comparatively narrow bore, while those from Italian tombs have a very wide bore, so wide that the beads have been described as rings. The width is due to the beads having been made over a rod, instead of a wire, so that they should not turn around when the eyes were inserted (PLATE I, Figs. 50, 51; Text, Fig. 7). The earlier beads seem to have been built up of ready-made eyes, so that little or nothing of the matrix is visible. But I have also seen beads of this kind, though rarely, from Italian tombs (Text, Fig. 5; PLATE I,



17[1] 18[2] 19[3]

FIGURES 17–19.—TYPES OF EYE BEADS

Figs. 40, 41, and possibly 42, which is made after Petrie's descriptions).

The three last mentioned types, J, K, and L, require more attention. They are certainly all later than the fifth century B.C. I know of few found in Italy. The one I have figured is from the Historical Museum in Berne, Case 24, Zollikofen, Nos. 24012, 10155; others are from Savieza, No. 18931; Rüchingen

[1] Surface view of stratified eye knob, with three dark and four light rings. The eye-spot is of clear transparent glass. The dotted line shows the depth to which the knob has been ground off. First in the XIX Dynasty, later in the fourth to the third century B.C.

[2] Section of a gold-glass eye. The eye-spot is transparent white glass, the ruled section represents the gold layer, which consists of a thin film reflected through the transparent eye-spot. Third to second century B.C.

[3] A modern Arabic Fatma eye, one half natural size. Base matrix pale blue. Central eye-spot black. Inner ring white, opaque; outer ring deep ochra yellow. Arabic.

and Grosshochstetten, Grab 1, No. 23747. In the Historisches Landesmuseum of Zürich there are many others, for instance Case 60, Nos. 15213, 1527. All are dated 'Late Latène," a rather indifferent chronology, considering the divergent opinions as to the ending of the Latène period, which some place in the last century B.C. while others protract it into the Christian era. Prof. Dr. P. Reinecke, who is the first to make a scientific study of beads,[1] places these two types with projecting triangular corner, and those with the comma-eyes in the "second half of Latène."

The type with the spiral eyes (Text, Fig. 16) is the most interesting to Egyptologists, being, as it were, a resurrection of the comma-eye beads of the XIX Dynasty (PLATE I, Figs. 27, 28). I know of no beads with such ornamentation from the long period between XIX Dynasty and the fourth or the third century B.C. The technique in both sets of beads, the older and the later, is the same,—a spiral or comma, superposed on a differently colored shield by means of stratification. Some of these late comma beads have the same wide bore and lopsided form which characterize the beads of the fifth century B.C. (PLATE I, Figs. 50, 51). The colors are, however, rarely yellow, but more generally deep, dull ultramarine blue base, white, narrow, shield, and deep chrome yellow comma. Yellow base is, however, not unknown, as is shown, for instance, by Figure 231 on Reinecke's chart. The type probably continued into the first century A.D., as would be indicated by a bead in a large and fine necklace in the University Museum of Perugia,—base fine Venetian red, shield white, comma blue. There is, however, much doubt about the nature of the necklace, which seems made up of beads from many periods, and it is not impossible that this red base bead is a companion to the gold glass eye bead of the third century B.C. (PLATE I, Fig. 58). Beads of this fine red base color are rare before the Roman Empire, at least in Italian tombs, but become numerous in the beginning of the imperial period.

Intrusions of Stratified Eye Beads.—Kisa and others contend that stratified eye beads continue to the time of the Lombards, evidently founding their opinion upon stratified beads found in necklaces of that time. Such are, for instance: Rome, Museo Nazionale, Castel Trosino, Necklace K; Nocera Umbra, CXII

[1] P. Reinecke, *Glasperlen vorrömischer Zeiten*, in Altertümer u. Heid. Vorzeit, Bd. V, Taf. 14, p. 60. Mainz, 1911.

and CV, both of which contain beads exactly similar to Figures 50, 51, 54 of PLATE I. In the Museo Cristiano in the Vatican Library, in the right-hand case near the door to the octagonal room, is a necklace with enormously large, typical beads of the third or fourth century A.D. from the catacombs. Mixed in are six beads of the fifth century B.C., like Figures 50, 51, 54. Similar intrusions are often found in necklaces excavated north of the Alps and referred to the Alemannic or Lombard period, but I will here call attention only to the remarkable necklaces from Ober-Salton near Charchow, Russia, now in the Stuttgart Historical Museum, dated in the seventh or eighth century A.D. These necklaces are much older, and mostly made up of beads of the third and fourth centuries A.D., together with some stratified eye beads of the fourth or third century B.C. of the same general type as Figure 59, but black and white. It is in fact rare to find a "Merovingian" necklace which does not contain intrusions derived from old Italian tombs, the preferred spoils of the barbaric invaders during the time of the great migrations. The greatest number of intruded beads in these necklaces are not, however, eye beads but the characteristic large, blue melon beads of the first centuries of the Roman Empire. See the Morgan collection of Merovingian antiquities in the Metropolitan Museum, New York, and the Lombard collections from Castel Trosino and Nocera Umbra in the Museo Nazionale in Rome, where many necklaces contain two or more such blue and green melon beads of glass or paste, the latter kinds especially abundant in early Etruscan tombs.

Cut Off Rods; Millefiori (Text, Figs. 3, 4; PLATE I, Figs. 55, 56, 60–64).—The last group or general class of eye beads seems to have originated at some time in the first or second century B.C. The technique has already been described (page 6). There are no data to fix the exact time or the place of the invention, but it seems probable that it took place in the time of the later Ptolemies and in Egypt. The earliest dated bead of this kind which I have seen is one in a necklace in the Alte Akademie in Munich, from Percheling, dated "time of Augustus." It forms the centre of a necklace of 45 gold-glass beads and four glass beads. The bead has a base of blue-gray glass, with a girdle made up of a window pattern of white, green and red minute squares.

Another bead, possibly made by cut off rods, is the one represented by Figure 55. I was not able to examine this bead

microscopically, but the minuteness of the eyes and ring would indicate that it was not made by stratification but by a cut off rod, which, first coarse, had been drawn out to diminish the pattern. If this is correct, the invention of the process can be dated back to the fifth century B.C. Certain it is, however, that the process did not come into general use until much later, a fact rather against the earlier date for its discovery, for when the process was once invented, eye beads could be manufactured with a facility and at a cost lower than before. A thousand eyes could now readily be produced in the same time as a dozen of the stratified kind.[1]

To discuss the numerous varieties of mosaic eye beads, would take up a volume or two, and I must confine myself to pointing out the more characteristic periods of these beads.

First Period.—From the early part of the Roman Empire, or from the end or, possibly, middle of the Ptolemaic period, and

[1]There is much divergent opinion concerning the time when mosaic glass was discovered, but a study of the collection of glass from the Palace of Amenhotep shows that four of the types date from that period. The following types of mosaic glass can be distinguished. *Fern and feather pattern.* Already perfected in the time of Thothmes III. and has been in use ever since. Its technique consisted in winding bands of glass around a cylinder and then while yet soft dragging or combing them up and down. *Breccia* or *agglomerated glass.* First found in the Palace of Amenhotep. It is made of varicolored fragments of glass sufficiently fused to form a solid mass. *Stratified mosaic.* Earliest specimen found on a ring from the Palace of Amenhotep. It consists of narrow bands of glass placed side by side or in layers and then rolled to the required thinness. In the Amenhotep specimen the bands are microscopic. The type becomes common in the Ptolemaic period. *Incrustated mosaic* becomes common in the ninth century B.C. It consists of a plain matrix of glass into which fragments of other glass are rolled in. *Onyx glass.* Made to imitate onyx and similar stones. It consists also of thin layers of glass which were rolled thin and then bent to form waves. This type is also found in the Amenhotep collection, but becomes common in the fifth century B.C. *Columnar mosaic.* Dates from the Ptolemaic period. Also called millefiori. Consists of innumerable rods of glass placed on end and then fused together. The mass was then cut transversely in sections. *Lamellated* or *Lamella glass.* Dates from the end of the Ptolemaic period. The lamellae or flakes of glass were placed horizontally on a flat sheet of glass, then fused and rolled in. *Maculated mosaic glass.* Sections of rods or fragments of glass were dropped into a fused matrix of another color and then stirred or dragged so as to form comet-like blotches and figures. Earliest is from the fifth century B.C. It becomes the most common type in the fourth century A.D. We have beads made of all these types. The *columnar* has furnished material for all the varieties of composite eyes since the type was first invented, with only a single exception, (PLATE I, Fig. 65) in which the ring consists of a twisted coil.

ending before the time of Constantine. Characterized by an abundance of clear glass, bright colors, fine technique, and with varieties with window pattern, scroll pattern, face beads, and mosaic-pattern of distinctly Egyptian type. In this period we also find numerous melon beads of translucent glass, characterized by rounded lobes and usually wide bores.[1]

Second Period.—The time of Constantine, not well defined, but including parts of the third and fourth centuries. Few of these beads have been described or grouped together as a whole. The beads are characterized by having eyes made of small disks, placed on the top of the matrix, and rarely rolled in (PLATE I, Fig. 63). The eye-spot is either very minute or very large, nearly always vermillion red, while the disk is pale lemon yellow. Flinders Petrie[2] is the first to figure such a bead and refer it correctly to the middle of the fourth century B.C.

The Murch collection in the Metropolitan Museum contains many beads of this kind. In some beads the eyes are strongly convex, made of mosaic rods, of millefiori pattern. The colors are fine, deep blue, blue green, light ash-blue, recalling the colors of the XIX–XX Dynasties. Other beads recall the triangular type of the third and fourth centuries B.C., with many eyes, which project by heavy knobs, but now made of cut off rods, instead of stratified glass as in the earlier beads. Other beads have inlaid coils of twisted threads, recalling those of the Rameside time, so that we can characterize this period as a kind of revival of early types. Black glass seems very common, and the technique is always coarse.

Third Period.—It is unknown when this period begins, but we find it well defined in the sixth century A.D. This degraded period of artistic work is characterized by a poor technique, coarse colors of red, yellow, brown, by a scarcity of blue, and green, except the bright "arsenic" or emerald green, which, together with certain bright and really fine shades of lemon and deep orange, now appears for the first time. In this period the "links" or crossed wave bands are common. The eyes are often square, and the beads often cubical or three-cornered. There is also a revival of the fern and feather pattern, produced by dragging the superposed spiral rings in one or two directions. Eye beads with knobs are common. Transparent glass is rare.

[1] James Curle, *A Roman Frontiers Post*, London, 1911.

[2] *Tanis*, Egypt Expl. Fund, London, 1886, Part II, Pl. VII, fig.

These beads are variously known as Merovingian, Lombard, or, in Germany, as "Alamannen." The principal collections, dated by coins of the sixth century A.D., are in the Museo Nazionale, Rome, from Castel Trosino and Nocera Umbra. The collection of J. P. Morgan of Merovingian beads in the Metropolitan Museum contains many and interesting necklaces of this period, which French investigators consider continued into the seventh and eighth centuries A.D.[1]

Later Mediaeval Types.—The material wherewith to judge the Carolingian beads and those of the period immediately preceding the Venetians, is either too scanty or too badly described to permit of discussion. We are told by several French investigators that "the Carolingian beads are similar to those of the Merovingians but very much larger." This statement is quoted in all text-books which mention beads of this period and does not advance our knowledge sufficiently to characterize the period. Lately Joseph Hampel (*Altertümer des frühen Mittelalters in Ungarn*, Braunschweig, 1906) has described and figured an immense number of mediaeval beads from the earliest time to, and including, the twelfth century A.D. Unfortunately the descriptions are not sufficiently detailed, and the figures are so much reduced and so crudely drawn in line, that our information is not greatly benefited by the great labor of the author. They show, however, that down to the twelfth century A.D. the millefiori process was in use to produce eye beads, and that these collections contain material of inestimable value for future study.

After the return of Marco Polo from the Orient, Venetian factories began to supply beads for export to uncivilized nations, employing principally the millefiori process in producing eyes. Unfortunately these early Venetian beads have never been the subject of study. Our only acquaintance with these beads is derived from examples found in tombs in Africa, America, etc. It seems to be generally presumed that the Venetians imitated the antique beads and that they do so to this day, partly in order to palm them off as veritable antiques. So far, however, I have failed to find a single Venetian bead which resembles an antique type sufficiently to be mistaken for one.

In the present day the Arab glass-workers in Hebron and other places produce large beads with ringed eyes, which are known

[1] Cl. Boulanger, *Le Mobilier Funéraire Gallo-Romain et Franc en Picardie et en Artois*. Paris, 1902–05.

as "Fatma" eyes. This amulet is flat, circular, about one inch across, in the centre being a circular, black, red, yellow or blue eye, surrounded by one or two broad rings of other colors. In the Vatican Museum of Egyptian antiquities are several of these beads or amulets, strung together with Fatma hands of glass, placed among antique Egyptian beads. Many Egyptian collections contain such modern intrusions, variously labeled Egyptian, Greek, or Etruscan (Text, Fig. 19).

Manner of Recognizing the Types.—The following hints may aid the student to recognize the three main types.

Impressed Rings.—The inlaid rings in these beads rarely adhere well to the matrix of the bead, and many beads are found with only concave ringlets, the impressed ring having fallen out. When the eye-spot is of the same color and quality of glass as the matrix, we can suspect that the eye has been produced by this process. The handsome and interesting eyes and bands of the Italian whorls of the ninth to the fifth century B.C. were always produced in this way.

Stratified Eyes.—Examined with a strong magnifier we find that the transparent or semitransparent eye-spot is lighter at the edges than in the centre, which is due to the fact that the spot is more or less lentoid with thick centre and thin edge. The rings are generally very irregular, but the outlines always soft and frequently wavy (Text, Figs. 2, 6, 5). When some eyes on a bead have a different number of rings from other eyes on the same bead, we can suspect that the eyes are stratified. If produced from cut off rods the probability is that all eyes of the same color came from the same rod, thus possessing the same number of rings. The central eye-spot is sometimes fallen, leaving the layer below uniform. Eye-spots differ generally from the bead matrix.

Cut Off Rods.—The eye-spot extends all through the eye from top to bottom, and is equally thick in the centre and at the margins. These eyes are often seen to possess a perspective depth, like a rod immersed in water. An eye consisting of an irregular fragment nearly always belongs to this class. The color is thus uniform throughout. Elevated knobs are not likely to be surrounded by rings, except near the apex. Eye-knobs with several rings down the sides are almost certainly produced by stratification (Text, Fig. 17).

GUSTAVUS EISEN.

EXPLANATION OF PLATE I

Figures

1–4. Glazed paste beads with ringed eyes, produced by painting impressed rings and dots. XVIII Dynasty. Egypt.

5. Glass bead from the author's collection, of a type similar to that described by Petrie as found with scarab of Thothmes III. Also in Lisht; also found in the Murch collection.

6–8. Similar types but differently colored. XIX Dynasty. Lisht. Metropolitan Museum, New York.

9. Glass, leaves produced by raking, simple eye. Lisht. Metropolitan Museum. XIX Dynasty.

10, 11. Glass, simple eyes. Lisht. XIX Dynasty. Metropolitan Museum.

12–26. Eye beads of glass with eye-rings, produced by stratification. From Lisht and Thebes. XIX Dynasty. Metropolitan Museum.

27, 28. Glass. Earliest eye beads of glass with comma-eye. XIX Dynasty. Lisht. Metropolitan Museum.

29–32. Earliest eye beads of glass with impressed coils, of the same type as the bead described by Petrie in *Illahun*, pl. XVIII, fig. 30, as of the time of Rameses II. Murch collection, Thebes (?). Metropolitan Museum.

33, 34. Glass beads with impressed coils and ringed eyes made by stratification. XIX Dynasty. Murch collection. Metropolitan Museum.

35–39. Glass pendents and beads which we are now able to fix as from the XIX Dynasty, generally described as from the "New Empire" or XVII–XX Dynasties. 36, author's collection. 37, 39, Lisht. 35, Murch collection. 38, Murch collection, ½ diameter of original.

40, 41. Earliest type of eye bead composed entirely of stratified blocks. Author's collection. Slightly enlarged. XXII to XXIII Dynasties. Thebes.

42. Earliest eye bead with quadruple eyes, according to Petrie (*Hyksos*, fig. I). XXIII Dynasty, from 766 B.C.

43. Earliest glass bead with stratified eyes found in Italy. Tomba della Straniera, Archaeological Museum, Florence. From Vetulonia. Sala I, vetrina III, Nos. 6156–6171. Undoubtedly Egyptian. Ninth to eighth century B.C.

44. Eyes made by stratification. Egypt. Author's collection. Ninth to eighth century B.C.

45–47. Earliest simple eye beads, made by impressed rings, found in Italy. A very common type, called by the Italian authors "color turchino con anelli." Generally poorly made. Probably Phoenician. Eighth to fifth century B.C. Most common in the eighth century, especially at Veii. Generally found in necklaces together with

very clear transparent white glass beads and with amber. Leprignano, Museo Etrusco, Rome. Eighth century B.C.

48. The finest type of stratified eye bead from Etruscan tombs of the eighth century B.C. Glass ultramarine blue, eye-rings chrome yellow. From Agro Falisco, Museo Etrusco, Rome. No. XXVIII—Central case in the second room.

49. Glass, flat, four cornered bead, a common type in Etruscan tombs of the eighth century B.C. This bead is seen from the side. Stratified. From Falerii, Museo Etrusco, Rome. XLIV—4465, 4019. The bore is generally small, the size of the eye-knob. Color, blue-green. Seen from the top the bead is almost square, with four eyes. A similar bead is figured on Pt. XXXI of *Album Musée Cant. Vaudois*, Lausanne, 1896, and marked "Bronze Age." Probably considered very precious as there is never more than one in a necklace.

50, 51. The most characteristic type of stratified eye beads of the fifth century B.C. in Italian tombs, but also found in Syria and Egypt, Cyprus, etc. The Cesnola collection in the Metropolitan Museum contains a large necklace. Earliest is a single bead from Falerii, Museo Etrusco, Rome, No. XXII; eighth century B.C.; possibly an intrusion. The latest are from the fourth century B.C., in the Arndt collection in the Glyptothek, Munich, Case N, and in the excavations of the "Kabirentempel" at Thebes, Greece, which cannot be earlier than 390 B.C. Munich.

52, 53. Similar type to the last. No. 52 with knobs, isolated eyes. No. 53 with approached eyes. Compare No. 42. Stratified. Fifth century B.C. No. 52 from Padua, Tomba della palazina, Museo Etnografico, Rome, Sala XXXVI, No. 56653. No. 53 is the commonest form in Etruscan tombs. Museo Etrusco, Rome, Palestrina, Barberini collection. Fifth century B.C.

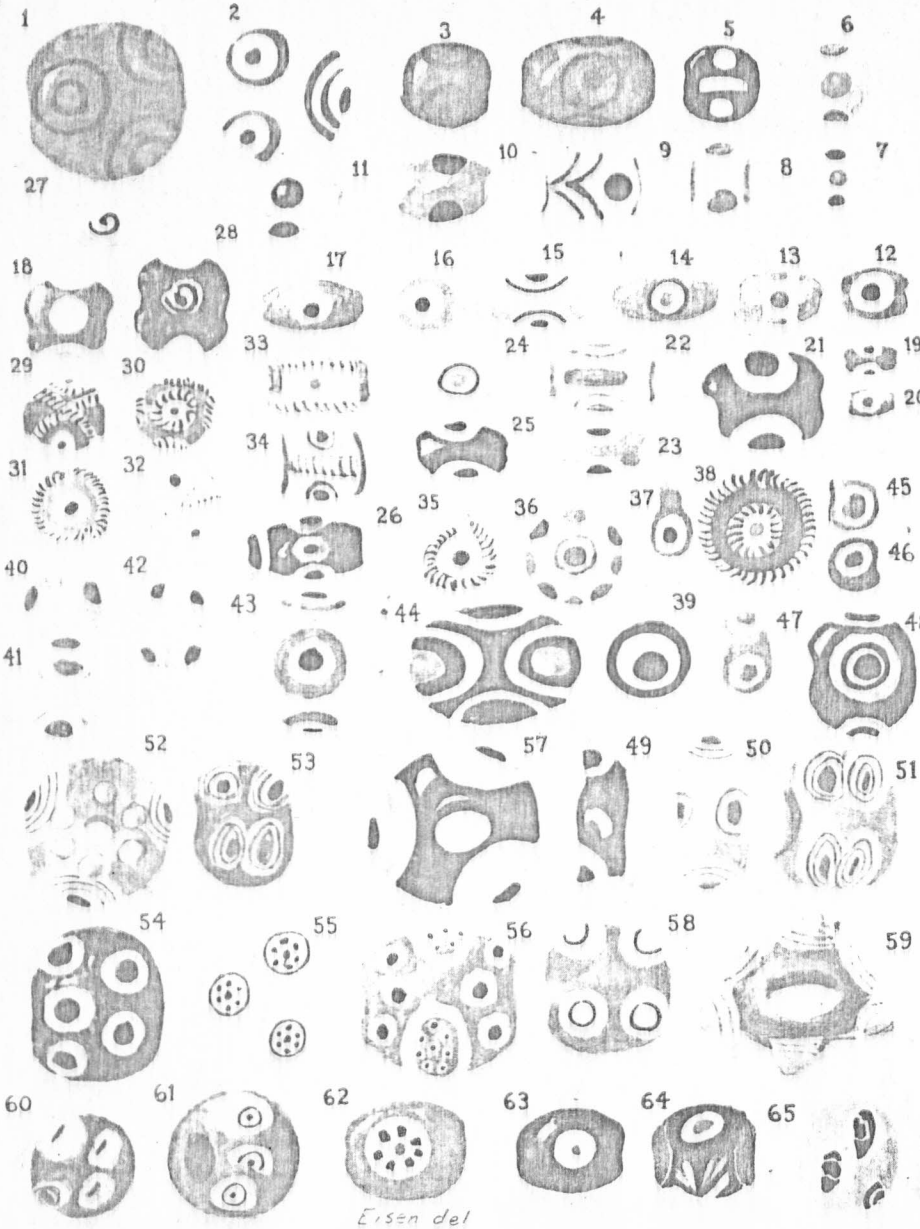
54. Glass, stratified eyes, ultramarine blue base. Common in Italian tombs of the fifth century B.C. Museo Etrusco, Rome, Corchiano, XVII.

55. Earliest eyes from cut off rods. Fifth century B.C. Museo Nazionale, Ancona, Sala H, Case 48; marked "primo età del ferro."

56. A similar type to 55. From the Barberini collection from Palestrina. Museo Etrusco, Rome. Mixed stratified eyes and cut off rods. Fifth century B.C.

57. Glass, stratified eyes. Seen from top; from Priene; private collection of Professor Dr. Paul Wolters, Munich. Earliest possible date 325 B.C. or fourth century B.C.

58. Glass, stratified eyes, with centres of gold-glass. Giorgio Sangiorgio collection. Rome. Third century B.C.
59. Typical glass bead of the third century B.C. Historical Museum, Berne; from Zollikofen, 24012. Stratified eyes. Some eyes with comma centres.
60–62. Glass, time of Augustus. Eyes by cut off rods.
63. Fourth century A.D. superposed disks, of cut off rods. Thebes. Author's collection.
64. Characteristic eye bead, sixth century A.D. Museo Nazionale, Rome; Nocera Umbra, CXL.
65. A Venetian intrusion; in an Etruscan necklace of the fifth century B.C.; Museo Etrusco, Rome; from Corchiano, XIV, 6036-6055, 6044. Third bead, left of centre. Eye-ring made of twisted threads of glass, overlapping on the matrix. Similar to an Ashanti bead in the Linden Museum, Stuttgart.



Eisen del

EYE BEADS