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The Classification and Chronology of the Islamic Glass Bracelets from al-Ṭūr, Sinai

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INTRODUCTION

Large numbers of glass bracelets that feature a variety of color, techniques, and decorative patterns, have been found in Islamic sites in the area bounded by the Eastern Mediterranean, the Red Sea and Indian Ocean. By classifying these important finds into detailed types and comparing them with the finds from other sites, it is possible to gain a clear glimpse of the nature of the Islamic trade in the vast region.

Serious research into glass bracelets from the Middle East began in the 1970s, and research based on excavated materials started in the latter half of the 1980s. Even without waiting for Spaer's mentions,¹⁾ the reasons for the delay of research into Islamic glass bracelets based on archaeological excavations include the lack of such excavations at the Islamic sites compared to ancient ones, and the fact that, despite the existence of layers piled up in the Islamic Period at the top of the excavation sites, they have been disturbed, or not paid sufficient attention due to greater interest in the lower layers. In addition, it cannot be denied that there is a tendency to overlook these small artifacts, and not to report about them in detail.

The excavations²⁾ carried out by the Middle Eastern Culture Center each year from 1985 to 1996 at the al-Ṭūr sites on the Sinai Peninsula yielded some 3000 glass bracelets from the 14th to the 20th centuries. There is no doubt that the detailed study of these materials to determine the date and province of manufacture is a significant step in the history of glass bracelet research.

Because of its strategically important location on the Red Sea, al-Ṭūr was used as a relay station on the transport route for grain exports from Egypt to Makka, and was a port of call for pilgrims to St. Catherine's monastery, Jerusalem, and Makka. It was also used as a fort against the Crusaders. In 1378, Amīr Ṣalāḥ al-Dīn Khalīl began to improve the port and invite visitors, and strengthened the role of al-Ṭūr as the official port of the Mamluk Dynasty, while 'Aidhāb and Quṣayr, which had been the important relay stations for Indian Ocean trade until that time, declined. The subsequent establishment of the Cape of Good Hope shipping route by the nations of Europe led to a decline in the importance of the Red Sea trade. After that, al-Ṭūr became a port-of-call on the official route for pilgrims to Makka. By the second half of the 18th century it even had customs and quarantine facilities, and these

functioned until the 20th century.

The dimensions of the al-Ṭūr sites are approximately 200m from east to west and 100m from north to south. The highest point of the tell is 6m. Digging investigations up to the present have excavated modern layers at the southern part of the West Area that faces the sea, the North Area (north of the tell), and the Central Area. Relics and ruins from the 14th to 20th centuries have been discovered in the southern parts of the West Area, and it has been confirmed that there are five strata. At the tell surface there is a disturbed layer, and beneath this the modern stratum (19th century and after), 1st stratum (18th to 19th centuries), 2nd stratum (16th to 18th centuries), 3rd stratum (14th to 15th centuries) and 4th stratum (14th to 15th centuries) have been discovered in order from the top. Each stratum is divided into a mud layer that includes ruins, and a layer of sand that accumulated naturally. A thick layer of sand that accumulated between the 15th and 16th centuries exists between the 2nd and 3rd strata, and the ruins separated by this layer of sand are different in character. The upper 1st and 2nd strata mostly consist of the ruins of private structures. The rooms are small in area, and many relics relating to daily life have been found. The rooms in the lower 3rd and 4th strata are large in area, and are thought to have been warehouses and official structures. Therefore, it is possible to categorize the modern stratum as the 1st culture stratum (19th century and after), the 1st and 2nd strata as the 2nd culture stratum (16th to 19th centuries), and the 3rd and 4th strata as the 3rd culture stratum (14th to 15th centuries).

In contrast to this, the mound at the North Area mostly consists of refuse, and from the state of dispersion of the artifacts it can be concluded that this layer was used as a dumping ground for unwanted cargo from ships, as well as domestic refuse. This region has yielded relics going back to the period of the 3rd culture stratum in the West Area. There is little in the way of ruins, but the existence of 1st and 2nd culture strata has been verified.

The objective of this paper is to categorize into types 918 glass bracelets found at the southern part of the West Area of the al-Ṭūr site in 1986, 1987, and 1989, and 365 glass bracelets found at the North Area of the site in 1988, 1990, and 1991, and to consider their chronology.³⁾

1. ISLAMIC GLASS BRACELETS (See Fig. 1)

The most important Islamic site in Egypt is al-Fustāṭ, and excavations are being carried out there by missions from Egypt, the U.S.A., Japan and France. With regard to glass bracelets, classification of 401 of the samples from the 9th to the 14th centuries excavated by the Japanese mission, has clearly established that most of the glass bracelets were manufactured in this area.⁴⁾ Other Egyptian materials in addition to these include Carboni's study of 33 glass bracelets collected in Upper Egypt and preserved at the Metropolitan Museum of Art.⁵⁾

With regard to the Red Sea coast region, there are reports on finds from Quṣayr

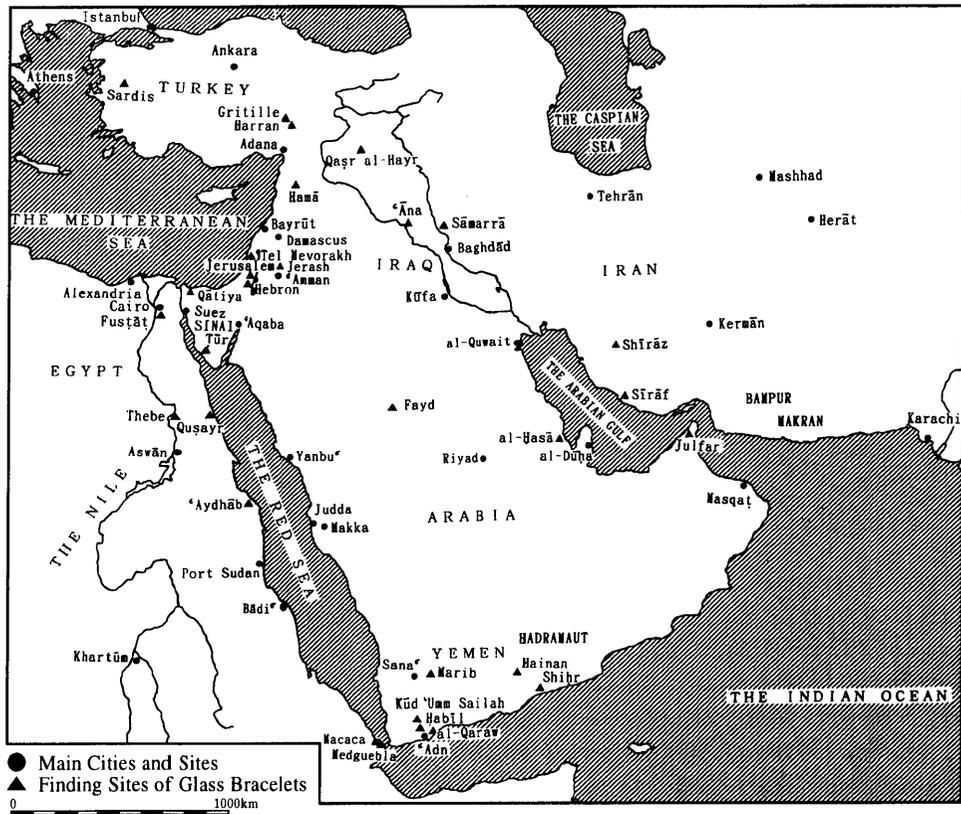


Fig. 1 Map of the main cities and sites

and 'Aidhāb. Meyer completed a detailed study of glass artifacts from Quṣayr al-Qadīm in 1993, and among the samples, 45 glass bracelets were investigated. These included undecorated bracelets, and bracelets with spiraled, pruned, cane, and polychrome decoration.⁶⁾ At 'Aidhāb, up until the present, missions from the U.K., Japan, France, and Sudan have carried out excavations and archaeological investigations. Six samples collected by the U.K. mission are stored at the British Museum in London, and in an archaeological survey, including a test digging, carried out by the Middle Eastern Culture Center in 1991, 62 samples were discovered.⁷⁾ These are mainly undecorated types with triangular cross-section, but types with marvered and applied decoration were also found.

Monod's report notes that the materials collected from the Sahara Desert to the Red Sea region include materials from Medguebla and Macaca on the Red Sea coast. Monod classified the Red Sea region bracelets into six types according to cross-section, and as can be seen from the illustrations in the report, there are many glass bracelets among the samples, decorated with intricate twisted trails.⁸⁾

In Yemen, many glass bracelets have been discovered and collected during archaeological surveys. The main sites are Kūd Umm Sailah, Ḥabīl, al-Qaraw (Zinjibār), Shiḥr, and Khanfār. Among these, the most important ruin site is Kūd Umm Sailah, and here a lot of glass frit and glass waste resulting from glass manufacture has been found.⁹⁾

With regard to the Syro-Palestine region, Spaer is attempting to classify and produce a chronology based on archaeological artifacts discovered in Israel. Spaer has classified the samples from the pre-Islamic to the Islamic eras into four types: A (undecorated), B (molded decoration), C (spiral-twisted decoration), and D (multi-colored mosaic decoration). With regard to the Islamic era, Spaer has placed particular emphasis on the detailed classification of Type D. In addition, based on the bibliography and materials stored in Vienna, Spaer has reported on glass bracelets from Hebron, the situation of which was unclear, despite the fact that Hebron was a famous glass manufacturing center. In this paper, Spaer introduced artifacts from Dan and Khirbet el-Minyeh and quoted excavation reports from Jerusalem, Tel Erami, Burj al-Aḥmar which also mention glass bracelets.¹⁰⁾

Glass bracelets of the Umayyad and Mamluk Dynasties have been discovered at Jerash in Jordan. In addition, archaeological investigations at the al-Roujum ruins in south Ghors and northeast 'Araba have yielded glass bracelets.¹¹⁾

In Syria, Zoudhi has carried out research into artifacts stored at the Damascus National Museum. The excavation reports of Ḥamā and Qaṣr al-Ḥayr mention glass bracelets in particular, and the report describes the appearance of more than 2000 bracelet fragments found at Qaṣr al-Ḥayr. In addition, glass bracelets have also been uncovered by excavations at Gritille and Harran in the southwest of neighboring Turkey.¹²⁾

In Iraq, bracelets from the Sāmarrā and 'Āna sites of the early Islamic era have been discovered. They were also found at Tell Gubba, excavated by Kokushikan University.¹³⁾

In Iran, in an archeological survey of the first quarter of the 20th century Stein found decorated bracelets at the Chah Husauni, Kumb, Qalat-i-Jamshid, Surkh-galat, and Lesh sites in the Makran region. Also, glass bracelets have been discovered at Sīrāf and Qaṣri Abū Naṣr in Old Shīrāz, but these have not been reported on in detail.¹⁴⁾

In Saudi Arabia, archaeological surveys have been carried out right across the peninsula, and glass bracelets have been found at al-Ḥasā. Also, investigations along the pilgrimage route from Kūfa to Makka have uncovered glass bracelets at the Fayd site.¹⁵⁾

In the Persian Gulf region, excavations by missions from Iraq, Germany, the U.K., France and Japan have discovered many bracelets at Rās al-Khaima. The reports do not go into detail, but approximately 200 of the finds are being exhibited in local museum.¹⁶⁾

In India, research into glass bracelets has been carried out since the 1950s. Excavation reports of Brahmapuri and Nevasa in western India note many fragments of glass bracelets, and point out that they were manufactured in the area. The techniques for manufacturing glass bracelets were brought to India by followers of Islam from Iran in the 14th century. Subsequently, manufacturing flourished, and glass bracelets were even exported back to the Middle East.¹⁷⁾

2. CLASSIFICATION CRITERIA

Two basic manufacturing techniques were used to make glass bracelets. The first involved bending a glass rod and joining the two ends, and among the archaeological finds the seams are clearly apparent.¹⁸⁾ Many of the artifacts made using this technique have a circular cross-section and have had a spiral twist applied. Also, artifacts with a triangular cross-section with sharp ridges also exist.¹⁹⁾ This is the same technique that was used to make bronze bracelets.

The second technique involved winding glass around the circumference of a metal rod and gradually pushing open the center hole while rotating the rod to form the bracelet. This was the most commonly employed technique in the Islamic era. The inner surface of a glass bracelet made using this technique is flat, and there are traces caused by chafing left behind. The resulting cross-section from this technique is either semi-circular, flat, triangular, or semi-elliptical, depending on the form applied to the bracelet. This technique is thought to be an extension of the winding technique used to make glass beads.²⁰⁾

With both techniques, arming cones are thought to have been used to remove strain and make the shape circular, in the same way as is done in small factories that produce glass bracelets in the north of India today.²¹⁾

The cross-sectional shapes have been classified into the following seven types: S1 (circular), S2 (semi-circular), S3 (flat), S4 (triangular), S5 (rounded triangular), S6 (intermediate between S2 and S3), and S7 (ribs in the longitudinal direction).²²⁾ Bracelets from al-Fuṣṭāṭ are overwhelmingly of the symmetrical S2 type, while

those from the al-Ṭūr site are mainly of the S2 and thin S6 type, or S5 types with an unsymmetrical, rounded triangular cross-section. Extremely narrow bracelets with widths of around 5mm exist.

Due to the fact that materials should be kept in Egypt, it is not possible to compare the fabrics used for the bracelets based on chemical analysis. However, results of the analysis of archaeological finds from other sites indicates that bracelets manufactured from lead glass and soda lime glass exist.²³⁾ Also, visual examination indicates variety in transparency, color, weathering, and manufacturing accuracy in the principal materials used.

With regard to transparency, the classifications are transparent, translucent, or opaque. Samples that have low transparency due to strong color tone and thickness are regarded as transparent, while samples that are cloudy and pass little light, but are neither thick nor strongly colored are regarded as translucent. Samples that pass no light at all are classified as opaque (only the transparent and translucent classifications are specified, and if not specified, the material is opaque). As it is difficult to convey subtle differences in color tone in writing, general color names are used to express colors, and differences in intensity are indicated. Also, the site neighbors the sea, so in particular the artifacts from the lower 3rd culture stratum have been affected by seawater, and are severely damaged. In addition to weathering, the classification includes judgment criteria for aspects relating to manufacturing accuracy such as bubbles, marks left after the manufacturing process, and distortion.

Different core constructions also exist. These include those that use a single fabric, double layered cores that employ two layers of glass in the forming stage, and cores that have been surface coated with glass of a different color after forming. Decoration is the most important criteria for type classification. The decoration techniques are described below, and the decorative elements are shown in Fig. 2.

3. TYPE CLASSIFICATION OF TYPES

Classification focuses on the decoration method, and there are seven types (A to G). These are A (undecorated), B (spiral twisted), C (marvered), D (protrusions applied), E (cut), F (enameled), and G (tooled). These major types are further classified into subtypes based on decorative elements.²⁴⁾

1) Type A (Fig. 3)

Type A is basically constructed using the stretch technique. Those made from black material are classified as Subtype A1, and those made from translucent blue material as Subtype A2.

The main cross-section for Subtype A1 is S5, and some have streak marks on the sides resulting from the manufacturing process. Subtype A1 has been discovered at various regions in Yemen and also at Rās al-Khaima.²⁵⁾ On the other hand, Subtype A1 bracelets have rarely been found at al-Fuṣṭāṭ, Quṣayr al-Qadīm,

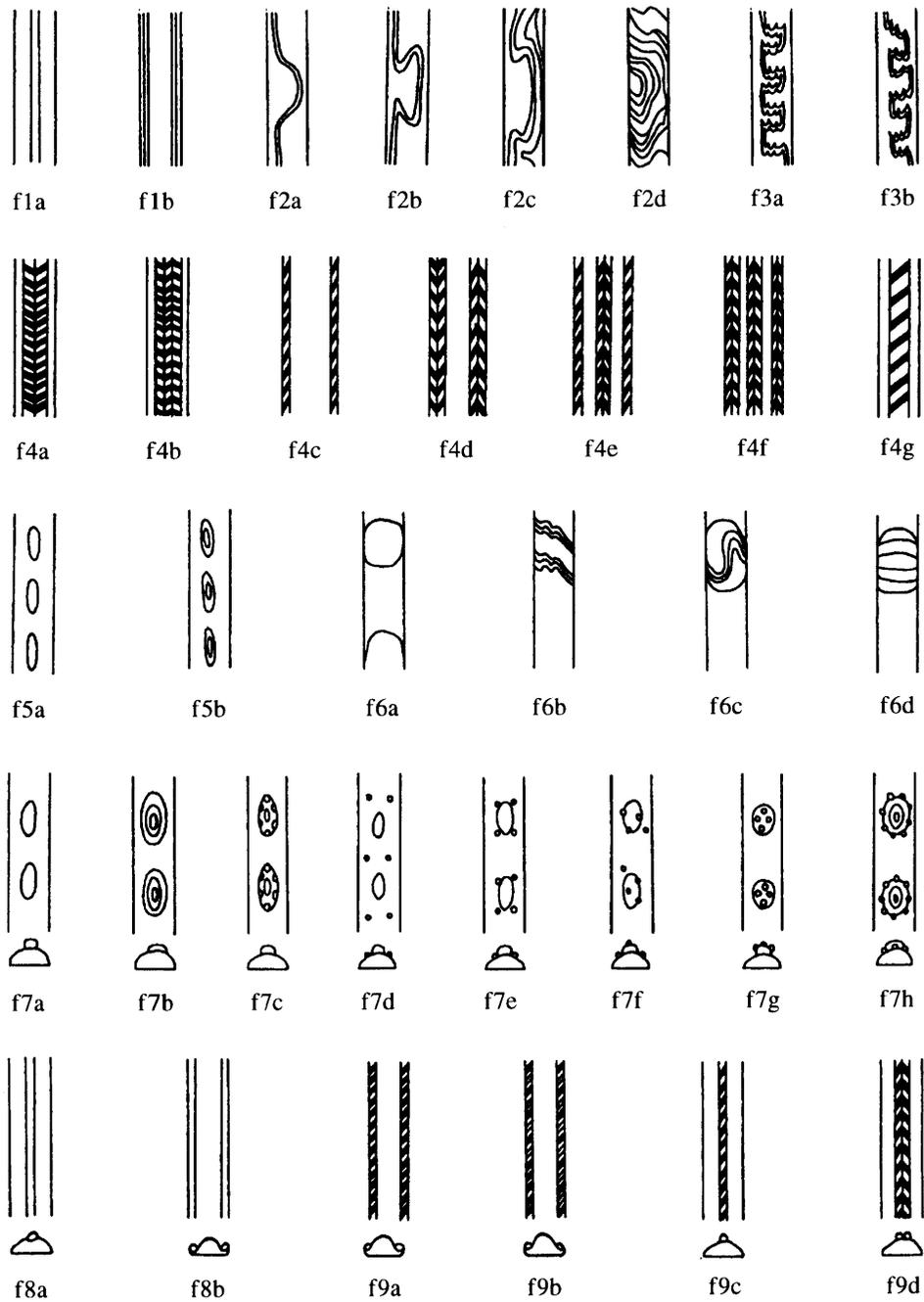


Fig. 2 Decorative Elements

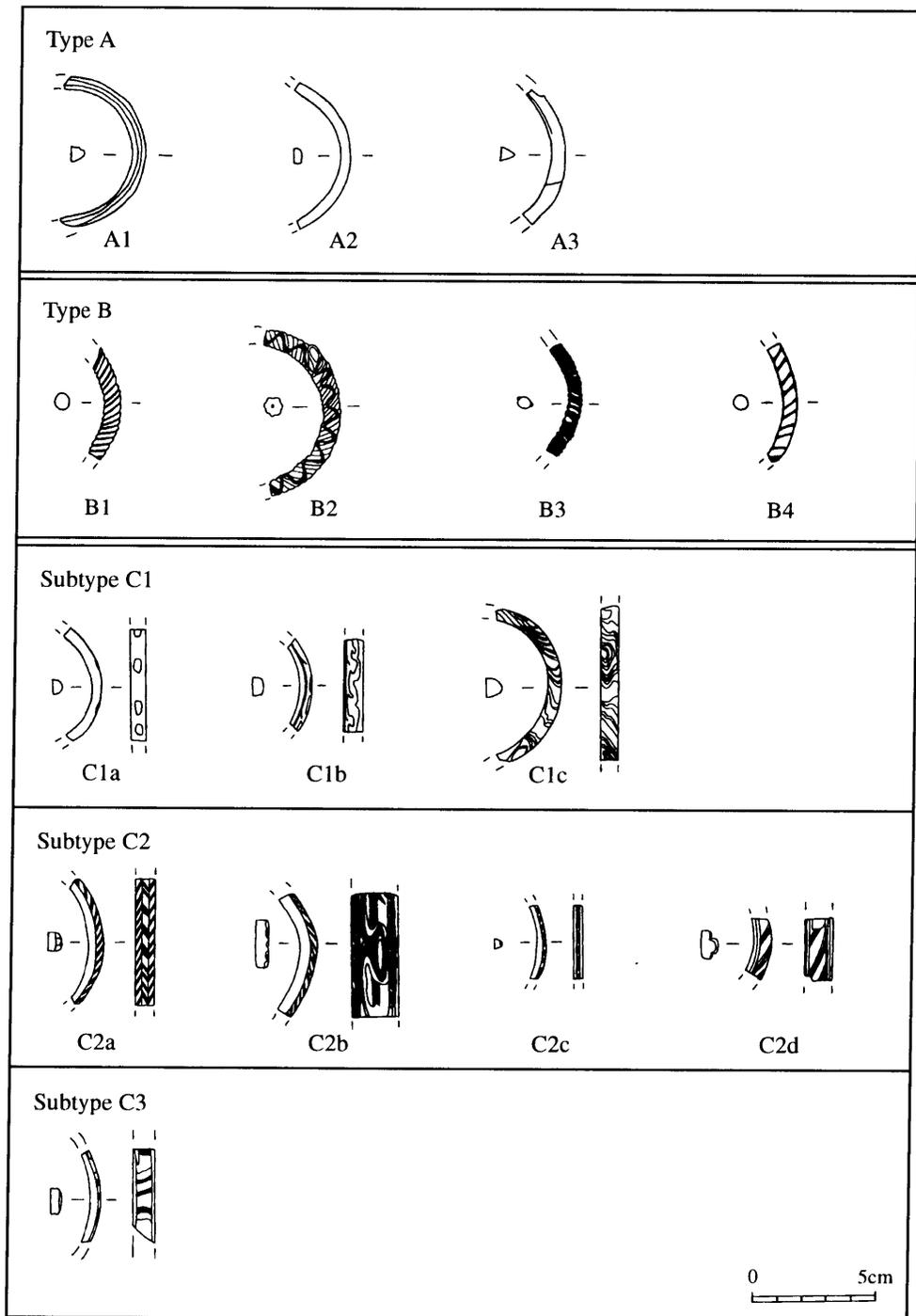


Fig. 3 Types A • B • C

or 'Aidhāb.

Subtype A2 mainly has S3 or S6 cross-sections. This translucent blue fabric is the same as that of Subtypes B2b and Subtype C3. Subtype C3 is noted in the 19th century Hebron materials presented by Spaer. With regard to Subtype A2, which is made from the same material, it is thought highly probable that they were manufactured in the same area or nearby.²⁶⁾

Other examples of bracelets with distinguishing features are those with an S4 cross-section and sharp edges (Subtype A3). The majority of the undecorated bracelets found at Quṣayr al-Qadīm, and 'Aidhāb have this cross-section. Color depends on whether the material is transparent or translucent, and includes blue, green, deep blue-green, and black.

2) Type B (Fig. 3)

Type B has spiral-twisted decoration, and corresponds to Spaer's Type C. These bracelets are made by twisting and stretching a rod of glass, then joining the two ends. The seam still remains on some of the bracelets among the finds. The cross-section is circular. The Type B classification has four subtypes: Subtype B1 (single-color, spiral-twist), Subtype B2 (spiral trails in the interior), Subtype B3 (glass trails wound around the exterior), and Subtype B4 (multiple trails of glass wound onto the exterior, and fused together so that there are no irregularities and the surface is smooth).

With Subtype B1, the spacing between the ridges differs depending on the twisting method and degree of force used during elongation. Most of the bracelets that have closely-spaced ridges and have been twisted in such a way as to produce sharp edges are black or green in color, while most of those with widely-spaced ridges and a gentle twist are translucent blue. These types correspond to Spaer's Type C1, and were found at excavations at al-Fuṣṭāṭ, Khirbet al-Minyeh, Qaṣr al-Ḥayr al-Sharqī, Ḥamā, Gritille, 'Ana, Julfār, and Jerash. In addition to these, archaeological investigations have uncovered examples at al-Rujoum, al-Ḥasā, Fayd, and Qaṣr Abu Naṣr.²⁸⁾

The body fabric of the Subtype B2 is transparent and the colors include colourless, pale green, and pale brown. The colors used for the internal spiral trail include white, yellow, pink and deep blue. The internal spiral normally consists of one trail, but examples exist that have two trails of different colors. This subtype corresponds to Spaer's Type C5, and from the Vienna materials, it has been established that they were manufactured in Hebron in the 19th century. Other examples have been found at al-Fuṣṭāṭ, Jerusalem, and Gritille.²⁹⁾

In the case of Subtype B3, there are either one or more glass trails wound around the exterior, and the spacing is either regular or irregular. There are examples from al-Ṭūr that have a single trail with uniform spacing, two alternating strands of different colors with uniform spacing, and multiple bundled trails with uniform spacing. The color of the center core is transparent pale green, or pale brown and black. The colors used for the decorative glass trails include red, yellow

and white. Examples have been discovered at al-Fuṣṭāṭ, Quṣayr al-Qadīm, Tel Dan, Khirbet al-Minyeh, Tel Hesban, Tel Erami, Jerash, Ḥamā, Rās al-Khaima, Sardis, Kūd Umm Sailah, and al-Ḥasā.³⁰⁾

Subtype B4 has either a transparent pale green or pale brown core with red or white decorative glass trails wound onto it. This subtype corresponds to Spaer's Type C3, and examples of it have been found at al-Fuṣṭāṭ and al-Rujoum.³¹⁾

3) Type C (Fig. 3)

Type C is classified into three subtypes according to the difference of decoration used. Subtype C1 is based on f1, f2, f3, and f5, Subtype C2 is based on f4, and Subtype C3 is based on f6.

Subtype C1 is further broken down into Subtype C1a with f5 as the basic decorative element, C1b with f2c as the basic decorative element, and C1c with f2d as the basic decorative element. For Subtype C1a, f5 is arranged in either one or two lines, and the cross-section is either S2 or S6. The core is black, and the decorative parts are either red or yellow. Similar examples have been found at al-Fuṣṭāṭ.³²⁾ Subtype C1b has either an S2 or S3 cross-section. The core coloration is predominately translucent blue, and in cases translucent orange. The color of the decoration is black, white, yellow or orange. These correspond to Spear's Type D1(1)/(3)e(b). The cross-section of Subtype C1c is mainly S2, with white, yellow, orange, and vermilion, and, rarely, yellow-green used as colors for the decoration. Examples can be found among finds from 'Aidhāb, Jerusalem, and Nevasa, and among materials from al-Qaraw (Zinjibār), Ḥadramaut, and Erytree.³⁴⁾

Subtype C2 is further classified by cross-section and width. Bracelets with a width in the range 0.6cm to 0.9cm, and S2, S3, or S6 cross-sections are classified as Subtype C2a, those with a width of 1.0cm or more and an S3 cross-section are classified as Subtype C2b, those with a width of 0.5cm or smaller and an S2 cross-section are classified as Subtype C2c, and those with an S7 cross-section are classified as Subtype C2d.

Subtype C2a has six pattern types based on combinations of decorative elements. C2a1 is based on f4a, C2a2 is based on f4b, C2a3 has a thick center strand, C2a4 has ellipses placed between the sides of the twisted glass trails, C2a5 is based on f4g, and C2a6 has a thick single strand of twisted glass in the center. The cross-sections are S2, S3, and S6, with variations from semi circular to flat. The cores are transparent light green, and f4 is black and white. Examples of Subtype C2a1 have been found at al-Fuṣṭāṭ, Qaṣr al-Ḥayr al-Sharqī, and al-Rujoum, examples of Subtype C2a2 have been found at Quṣayr al-Qadīm, 'Āna, al-Rujoum, and Erythree, examples of Subtype C2a3 have been found at Tel Dan, Khirbet al-Minyeh, and Jerash, examples of Subtype C2a5 have been found at Tel Dan, and examples of Subtype C2a6 have been found at Quṣayr al-Qadīm and Rās al-Khaima. Among these, Subtype C2a3 corresponds to Spaer's Type D2(1)e(a).³⁵⁾

Subtype C2b has three pattern types formed by combinations of decorative elements. C2b1 is based on f4a or f4b and corresponds to Spaer's Type D2(2)e(b).

Subtype C2b3 is a combination of deformed f4 feathers and f1b. The cross-section is a wide S3. Due to weathering, the original color of some bracelets is unclear, but the cores are transparent blue, and black in a few cases. With regard to decoration, the f4 parts are black and white, with red and yellow etc. being used for the other parts. Examples have been found at Khirbet al-Minyeh and Qaṣr al-Ḥayr al-Sharqī.³⁶⁾

Subtype C2c has an S2 cross-section, and is distinguished by its narrow width. The core color is either white or transparent pale green, and white, red, dark blue and yellow have been used for the decorative parts. Examples have been discovered at Rās al-Khaima and Brahumapuri.³⁷⁾

In the case of Subtype C2d, the majority of decoration combinations are the center thick f4g with f4c or f1b. The colors are transparent pale green or green for the core, and white, red, and black for the f4 decorative elements, and red or yellow for the f1b decorative element. Examples have been found among the Erytree materials.³⁸⁾

Many of the Subtype C3 use f6d on its own. The cross-sections are either S3 or S6. There are three core colors, translucent blue, transparent pale blue or pale green, or black, and many bracelets have a light blue, yellow-green, or yellow coating over the transparent foundation. The decoration is basically orange or yellow, and these colors are combined with black and white, blue, green and vermilion. When classified by color of the core the translucent blue types are seen as Spaer's Type D1(2)b(b), and similar examples can be found in bracelets of Hebron manufacture. The transparent pale blue and pale green can be found in Spaer's Type D1(1)d(a) and Type D1(2)d(b). The black corresponds to Spaer's Type D4(1)d(a) and Type D4(4)d(b). There are reports of bracelets decorated with red, yellow and blue from Qaṣr al-Qadīm, and investigations by Stein at Bampur also uncovered these. In addition, bracelets with red cores, which have not been found at al-Ṭūr, have been found in large quantities at Rās al-Khaima, and are on display at the Rās al-Khaima Museum.³⁹⁾

In addition to these, there are small numbers of special Type C bracelets that do not belong to any of the above categories.

4) Type D (Fig. 4)

Type D has applied decorations that protrude, and in many cases this is combined with marvered decoration. The protrusions are one of two types, prunts (f7) or protruding bands (f8 and f9). Bracelets with prunts only are classified as Subtype D1, bracelets with protruding bands only are classified as Subtype D2, and bracelets that have prunts and protruding bands in combination are classified as Subtype D3.

Subtype D1 is further classified into the following five subtypes. Those that have a single line of prunts are classified as Subtype D1a, bracelets that have a single line of prunts combined with marvered decoration are Subtype D1b, those with multiple lines of prunts are classified as Subtype D1c, those with almond

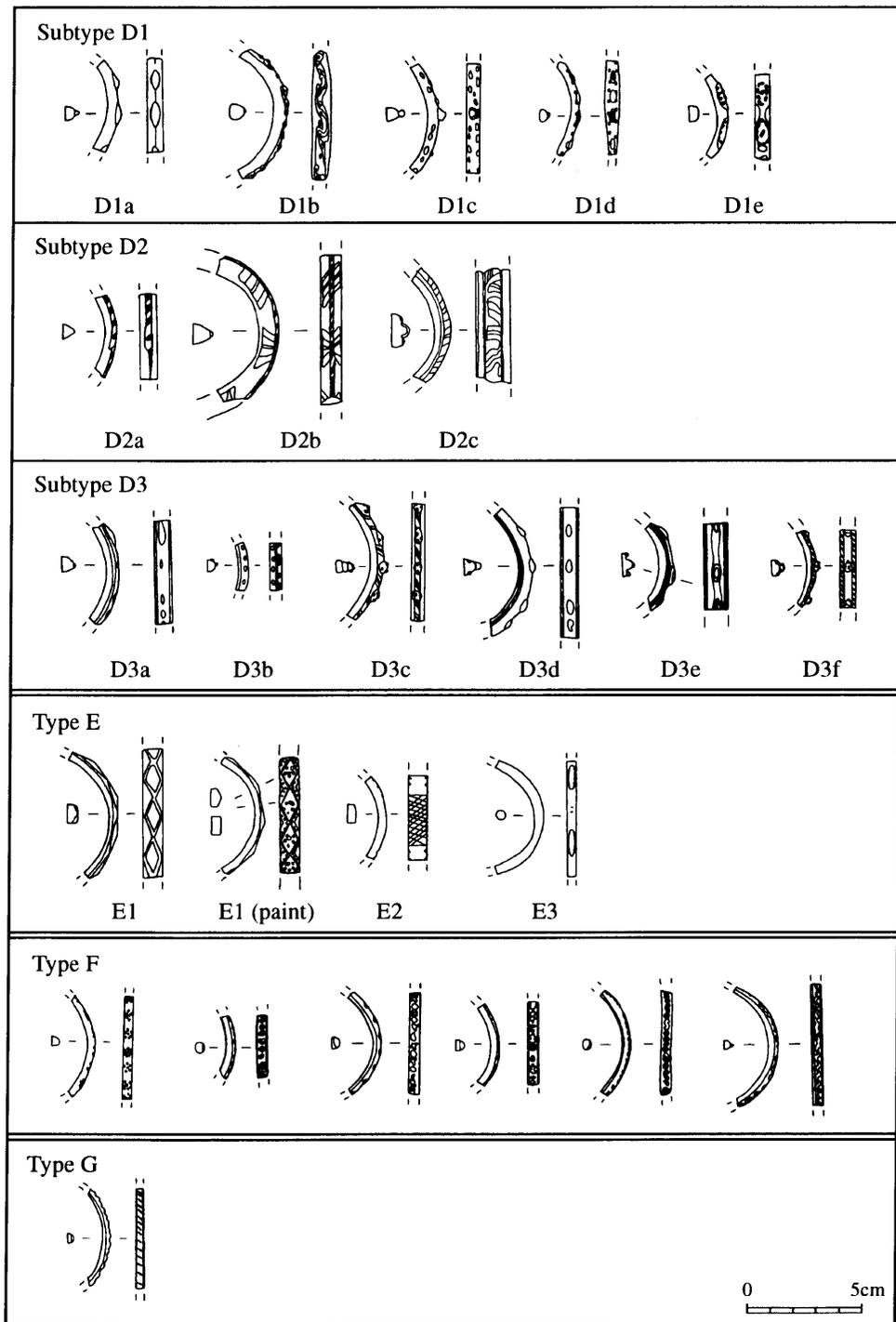


Fig. 4 Types D • E • F • G

shaped prunts combined with small prunts are D1d, and those with compound arrangements of prunts are D1e.

There are three prunt styles for Subtype D1a; f7a with large almond-shaped prunts, f7a with small square-shaped prunts, and f7b which has concentric ring prunts. The cross-section of the bracelets decorated with the f7a small square prunts is S6, and the cross-section for the others is S5. Artifacts found in the lower layers are severely weathered, and the color is not clear in many. For those for which the color can be determined, the cores are black, dark blue, translucent blue, transparent blue, and transparent green. The f7a decorative parts are white and yellow, and the f7b decorative parts are white and blue. There are many examples, the oldest being from 9th century Sāmarrā. Examples from the 13th to 15th century have been found at al-Fuṣṭāṭ, Quṣayr al-Qadīm and 'Aidhāb, and in addition, they have also been discovered at Kūd Umm Sailah, Ḥadramaut, Tell Gubba and Rās al-Khaima. Among these, the finds from Rās al-Khaima with the same decoration have a finer cross-section and are different from the others. The translucent blue with small white f7a squares corresponds to Spaer's Type D1b(a), and exists among the 19th century Hebron materials.⁴⁰⁾

Subtype D1b is decorated with f7 over the marvered decoration, and the combinations f2b + f7b, f2d + f7a, and f6d + f7a exist. The cross-section is either S2, S5 or S6. Core colors are blue or blue-green and transparent pale green, and f2 and f6 are yellow and orange, while f7 is yellow, orange and white.

With Subtype D1c, there are bracelets that have the same arrangement as Subtype C1a, differing only in the degree of protrusion, and others that have variation in the alignment and size of the prunts. The cross-section is S6, the core color black, and the decoration color white.

The decorative elements for Subtype D1d are f7d, f7e, and f7f. Careful observation of these decorations reveals that they are different from f7a, f7b, and f7c that have larger prunts in the center. There is a variety of cross-section type, with S5 and S6 being comparatively numerous. The core colors are black, deep blue, transparent pale green, and transparent pale green with an orange coating. The colors in the center of the decoration are deep blue, white, red, orange, yellow, and yellow-green.

Subtype D1e has either an S3 or an S5 cross-section. The core color is black, and the central colors for the decorative parts are red, orange, white and dark blue, and the colors used for the peripheral regions include white, pale blue, blue, yellow, vermilion and yellow.

Subtype D2 has four sub classifications. Subtype D2a has a protruding band in the center, Subtype D2b has a marvered decoration, with a protruding band on top of it, Subtype D2c has protruding bands on both sides, and Subtype D2d has protruding bands at the center and both sides. A protruding band is formed by winding glass trails (that become the protruding band) in the longitudinal direction around the core of the bracelet after it is formed, then fusing the ends. When this is done, the parts of the hot glass trails that come into contact with the core section

shrink slightly and spread out. One of the ends of the trail is thin because it is stretched and cut.

Subtype D2a has one of f8a, f9c, or f9d, and the cross-section is either S4 or S5. The core colors are blue, white, yellow-green, black, translucent green, or transparent brown, and the decorative colors are combinations of yellow, green, and black with yellow or white, and also white and red, yellow, and translucent brown. Similar examples to this subtype can be found in Spaer's Type D3(1)e(a) and Type D3(1)e(b). Type D3(1)e(a) was found in the 8th century (approx.) layer of Khirbet el-Minyeh. In addition, similar examples have been found at Quşayr al-Qadīm, Ḥadramaut, and Bampur.⁴¹⁾

The decorative elements used for Subtype D2b are f2 and f6, and these are combined with either f8a or f9c. The cross-section is S5. The core color is either green or yellow-green, with f2 being mainly yellow and orange, and f9a mainly white and black. The typical patterns correspond to Spaer's Type D3d(a)/(b), and examples have been found at Khirbet el-Minyeh and Tell Mevorakh.⁴²⁾

Subtype D2d has the pattern f8b + f8a + f9c, and an S5 cross-section. The center core colors are either transparent pale green or black, and the decoration colors are yellow, red, white and black. Similar examples have been found at Ḥadramaut.⁴³⁾

Subtype D3 is further separated into six subtypes. In the case of Subtype D3a, there is a line of prunts on the protruding band in the center of the bracelet, Subtype D3b has rows of prunts on the top and sides of the protruding central band, Subtype D3d has a row of prunts between the sides of protruding bands on the bracelet, Subtype D3e has the same decoration pattern as Subtype D3d, but with an S7 cross-section, and Subtype D3f has compound rows of protrusions between the sides of raised bands on the bracelet.

The decoration for Subtype D3a is a combination of f8a and f7, and the cross-section is either S4 or S5. The center core colors include transparent pale green and white-green, and the decoration colors are red, orange, yellow or white. Examples with the f4a + f7b combination have been discovered at al-Fuṣṭāt.⁴⁴⁾

Subtype D3b includes two styles, one having small f7a arranged on both sides of f8a, and the other having fairly large prunts on slightly thick f8a, with rows of small prunts on both sides. The former has an S2 cross-section with a core color of transparent pale green coated with either yellow-green or white, and the decorations are red, yellow, white or light green. The latter has an S5 or S6 cross-section, a core color of deep blue or transparent brown, and decoration colors of white, pale green, white-green, red, yellow, green, or deep blue.

The combinations of decorative elements for Subtype D3c are f7a + f7g + f8a + f1b, and f7f + f9c. The cross-section is S5, the core colors are transparent light green or deep blue or transparent brown and the decorative colors are white, deep blue, red, orange, yellow and vermilion.

Subtype D3d has seven varieties of combinations of decorative elements. These are f7a + f8b, f7a + f9a, f7b + f8b + f9a, f7b + f9a, f7a + f7c + f8b, f7a + f7c

+ f9a + f6d, and f7a + f8a + f9a. The cross-sections are either S2 or S5, with f7a + f8a + f9a only being S6. Almost all examples have weathered and in many the colors are unclear. For those that can be judged, the core colors are black and transparent pale green, and the decoration are combinations of yellow, orange, yellow-green, white, vermilion, black, green, and transparent pale green. Many examples have been found at al-Fuṣṭāt, Quṣayr al-Qadīm, 'Aidhāb, Ḥamā, Kūd Umm Sailah, Khanfar, Ḥadramaut, al-Ḥasā, Bampur and Kumb. The combinations of decorative elements for the enameled bracelets are the same, but the cross-sections are different.⁴⁵⁾

Subtype D3e does not have an applied protruding band. Here the decorative effect is achieved by piling up the center part. The four combinations of decorative elements used are f7a + f9a + f1b, f7b + f8b, f7b + f9a(+1b), and f7b + f9b + f1b. Excluding bracelets that have weathered and whose color cannot be determined, the color of the core is black, and the decorations are yellow, red, white, and black.

Subtype D3f features an alternating combination of protruding bands with prunts of another type, and employs the compound f7g prunts. In concrete terms these include f8b + f7a alternated with f7b, f9a + f7a alternated with f7b, f9a + f7a alternated with f7g, and f9a + f7g. The cross-section is S6, and S5 in the case of f9a + f7a + f7b only. The core colors are transparent pale green or transparent brown, coated with yellow, orange, pale blue, or white, and the decorative colors are orange, yellow, yellow-green, pale blue, white, deep blue, and black.

5) Type E (Fig. 4)

Type E is made using molds, and for decoration, the surface is either cut, colored with enamel, or plated with metal.⁴⁶⁾ The fabrics used differ from the other bracelets, and have a dull transparency and brilliancy, and vivid color representation. Colors include transparent red, orange, green, yellow-green, pale brown, pale blue, blue, and deep blue. Type E is classified by cutting technique as follows: Subtype E1 (face cut), Subtype E2 (incised cut), and Subtype E3 (face cut with incised lines).

Subtype E1 has an S3 cross-section, and marks remain, making the sides appear as if they had been cut away. The periphery has been faced, leaving a series of relief diamond shapes on the surface, while the decoration technique is either molding or cutting. The colors include transparent red, orange, yellow, yellow-green, light brown, pale blue, blue and deep blue. In addition to the diamond shape decorations, some examples have been painted. Examples have been found at al-Fuṣṭāt.⁴⁷⁾

The cross-section of Subtype E2 is S3, and there are examples that have been metal plated and painted in addition to being incised with lines. It is possible to classify the bracelets according to the combination of techniques used (incised with lines only, incised with lines and metal plated, incised with lines and painted, incised with lines, metal plated, and painted). The line incising bears a very close resemblance to that on shell bracelets found at Brahmapuri.⁴⁸⁾

Subtype E3 has a narrow S1 cross-section with a diameter of approximately 3mm. Some examples are decorated with both elliptical shapes cut into the surface and line incising, and are metal plated.

6) Type F (Fig. 4)

Type F has a narrow S2 or S3 cross-section. The main decorative pattern consists of ellipses in a row in the center with rows of dots on either side, and others include flower shapes with a large ellipse in the center surrounded by dots, ellipses combined with circular lines, rows of alternating circles and crosses, rows of alternating circles and 'S' marks, and rows of alternately positioned wavy lines. There are two core types—one is a single deep blue layer, and the other is a dual-layer construction with a white or slightly bluish-white layer covered with either deep blue or vermillion. The decorative colors are red, yellow, green, blue, light blue, white, yellowish white or bluish white. Examples with the cross and 'S' designs have been found at Rās al-Khaima, and examples with the dotted flower pattern have been found at Nevasa, and also at Bampur by Stein. Examples with the wavy lines in the center have been collected at Kūd Umm Sailah.⁴⁷⁾

7) Type G (Fig. 4)

Type G bracelets have had an undulating impression made in the surface using a tool. They are narrow in width and have an S2 cross-section. There are two core types—deep blue, and a white (or whitish) base covered with deep blue, the same as Type F. Examples have been found at Kūd Umm Sailah and Nevasa.⁴⁸⁾

4. CHRONOLOGY AND CONCLUSION

The above discussion has concerned the classification of glass bracelets found at the southern part of the West Area, and the North Area of al-Ṭūr. As mentioned earlier, to investigate the chronological transition of these glass bracelets, the area was divided into five strata, and three culture strata covering the period from the 14th to the 20th centuries. The archaeological finds from the southern part of the West Area are a useful aid in investigating this chronological transition. The number of finds from the respective culture strata are given in Tab. 1.

The disturbed surface layer and 1st culture stratum which were formed after the 19th century have yielded 386 finds, and the order of frequency among these is Subtype A2, Subtype D2b, Subtype C3 and Subtype E1. Subtype D2b was discovered in the 13th century layer at Khirbet al-Minyeh and Tell Mevorakh. However, while there have been a few finds in the 3rd culture stratum at al-Ṭūr, the number increases from the 2nd to the 1st culture strata. Also, similar examples to Subtype C3 are among the 19th century Hebron products. Subtype A3 and Subtype C3 share the same core material, and Subtype C3 and Subtype D2b share the same decoration patterns and color arrangements, so the three subtypes are closely related. 250 (64.8%) of the 386 finds in the disturbed part of the surface layer and

Table 1

Type	The southern part of the West Area	S.W.A.	S.W.A.	S.W.A.	S.W.A.	S.W.A.	North Area
Stratum	Total	Surface disturbed layer	1st culture stratum	2nd culture stratum	3rd culture stratum	Disturbed layer	Total
A1	130	11	13	57	38	11	14
A2	234	128	34	41	5	26	8
A etc.	39	19	1	7	6	6	19
A Total	403	158	48	105	49	43	41
B1	20	0	0	5	12	3	7
B2	0	0	0	0	0	0	10
B3	17	0	1	6	8	2	6
B4	6	0	0	2	2	2	16
B Total	43	0	1	13	22	7	39
C1	33	5	6	12	6	4	5
C2	40	5	10	6	9	10	12
C3	55	23	10	14	0	8	23
C etc.	4	0	2	2	0	0	9
C Total	132	33	28	34	15	22	49
D1	41	3	8	17	10	3	37
D2	157	40	19	48	16	34	73
D3	63	2	3	19	33	6	21
D etc.	0	0	0	0	0	0	0
D Total	261	45	30	84	59	43	131
E1	33	24	0	0	0	9	28
E2	7	6	0	1	0	0	1
E3	2	2	0	0	0	0	0
E etc.	4	3	0	0	0	1	0
E Total	46	35	0	1	0	10	29
F Total	32	3	5	16	3	5	64
G Total	1	0	0	1	0	0	12
Total	918	274	112	254	148	130	365

* S.W.A. = The southern part of the West Area

the 1st culture stratum are thought to be Subtype C3 from Palestine, and this indicates that there was a relationship between Palestine and al-Ṭūr at the time. In addition, 33 examples of Subtype E1 have been found, 24 in the disturbed part of the surface layer or disturbed parts of other layers, while none were found in strata below the Modern. This indicates that they were probably manufactured after the beginning of the 20th century. The Anthropological Museum in Paris has a collection of bracelets worn by the Egyptian women at a village in the Delta in the 1930s, where this type is also present.⁴⁹⁾

A total of 254 bracelets has been found in the 2nd culture stratum, and the order of frequency is Subtype A1, Subtype D2b, and Subtype A2. Most examples of Subtype A1 were found in this 2nd culture stratum, but they have also been found in the 1st and 3rd culture strata. These subtypes are rare at the sites of al-Fuṣṭāṭ, Quṣayr al-Qadīm, and 'Aidhāb that were destroyed in the 14th century. On the other hand, they are widely dispersed in Yemen and the Persian Gulf region. It is not possible at present to make conclusions regarding the manufacturing locations, but at the very least, it is possible to surmise that the bracelets were imported to al-Ṭūr from the southern areas of the Red Sea after the 15th century. The principal finds in the 1st culture stratum, Subtype D2b and Subtype A2, have also been found in quantity in the 2nd culture stratum. There has also been a high rate of finds in the 1st sand layer, and this makes it possible to confirm the continuity with the 1st culture stratum. However, with regard to Subtype D2b, finds have also been made in the lower strata, also, although there have not been a lot of Subtype C3 finds (C3 has the same fabric as Subtype A2), they exhibit the same tendency as the Subtype A2 finds. Although few in number, examples not found in the 1st culture stratum include Subtype B1, Subtype B2, Subtype B3, Subtype D4 and Type F. With the exception of Type F, there is a high rate of finds from the 2nd stratum, indicating a continuing flow from the 3rd culture stratum.

A total of 148 bracelets have been found in the 3rd culture stratum, and among these, Subtype D3 and Subtype A1 are the most common. Of the 63 Subtype D3 bracelets, 33 were found in the 3rd culture stratum, and of the 18 bracelets found in the 2nd culture stratum, 15 were found in the lower 2nd stratum. Subtype D3 examples are widely dispersed over the area from Egypt to the Red Sea, Yemen, and Iran, and this indicates that this delicate bracelet was widely used as trade item. This type required advanced manufacturing techniques, and it is thought that only a limited number of workshops were able to make them. Given the relatively low rate of finds for this type of bracelet in al-Fuṣṭāṭ, which was Egypt's main center for manufacturing and commerce, and that Subtype C2b and Subtype D2b, which use the same twisted glass trail decoration technique, are of Palestinian origin, it is thought possible that Subtype D3 was manufactured in the Palestine region. With regard to Subtype A1, the finds are dispersed over the area from Yemen to the Persian Gulf, and there have been almost no finds at al-Fuṣṭāṭ, Quṣayr al-Qadīm, or 'Aidhāb. This subtype has been found in the 1st and 2nd culture strata, indicating that it was used for an extensive period of time. Subtype B1, Subtype B3, Subtype

B4 and Subtype C2b have mainly been found in the 3rd culture stratum. With regard to Type C, there have been almost no finds of Subtype C1 (white or light blue on a black base, with elliptical or wavy design elements) that was commonplace in al-Fuṣṭāṭ at the time, but the Palestinian Subtype C2b has been found.

When the situation of the finds in the northern area of the ruins is examined, significant points of difference from the situation of the southern part of the West Area become apparent. As can be seen from Tab. 2 & 3, compared to the southern part of the West Area, the number of Type A finds is extremely low, while the number of Type F and Type G finds is high. Also, in addition to Type G and Type F, among the Type C and Type D finds are examples that have narrow width, and the same core coloration and construction. Given that the North Area layer in which the bracelets were found roughly corresponds to the disturbed part of the surface layer and the 1st culture stratum of the southern part of the West Area, the discrepancy in this trend is clearly apparent when compared to these strata in the West Area. The following discussion focuses on this group of narrow-width bracelets with respect to the North Area.

The widths of the bracelets in this group are narrow (0.4cm to 0.5cm), and the construction is either a single layer of deep blue, or a dual-layer construction that has a white base with a layer of deep blue on top (however, vermilion is used in place of deep blue in some examples). When classified according to decoration technique, Type F is the most common, and included are Type G, Subtype C1, Subtype C2, Subtype C3, and Subtype D1. The total number of examples that can clearly be included in this group from the North and southern part of the West Area is 200. The 60 of these found in the southern part of the West Area can be broken down as follows: Type F: 32, Type D: 22, Type C: 5, and Type G: 1. Of the 140 items found in the North Area the breakdown is as follows: Type F: 64, Type D: 36, Type C: 28, and Type G: 12. Expressed as a percentage of the total number of finds, the ratio for this group is 6.5% in the southern part of the West Area, and 38.4% for the northern area. Clearly, the ratio is much higher for the northern area.

With regard to Type F, which is representative of this group, excluding the five finds in the disturbed section of the southern part of the western area, 16 of the 27 were found in the 2nd culture stratum, and five in the 1st culture stratum. This positions them chronologically between the 16th and 19th centuries. In the case of the northern area, 49 of the 64 finds were found in the disturbed part of the surface layer, and after confirming the stratum order, it was concluded that seven bracelets were found in 2nd culture stratum, and eight in the 2nd culture stratum. Because the majority of the North Area is rubbish and accumulated sand layers, the disturbed part of the surface layer does not just contain relics from the 20th century, but also includes many from earlier eras, and these types are thought to be from the period between the 16th and 19th centuries. As mentioned earlier, similar examples can be traced to Yemen and the Persian Gulf and all the way to India. In particular, as pointed out by Hansmann, it is very possible that these bracelets were

Table 2

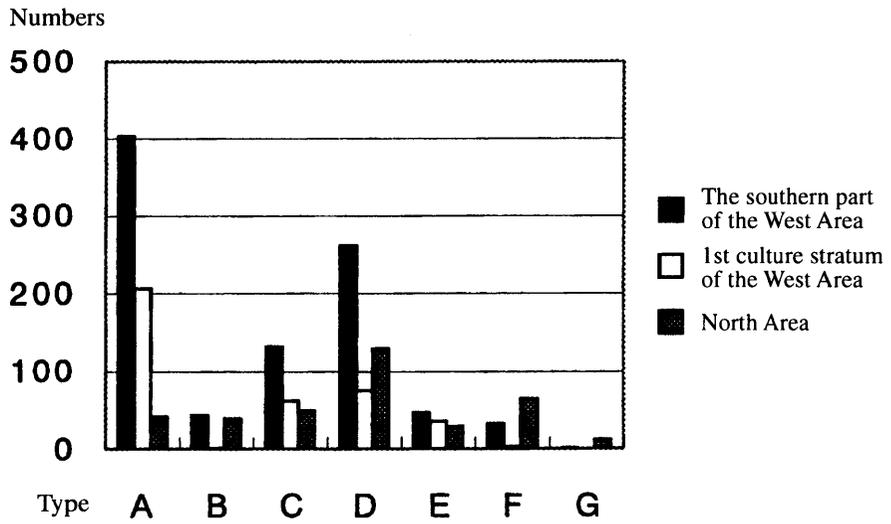
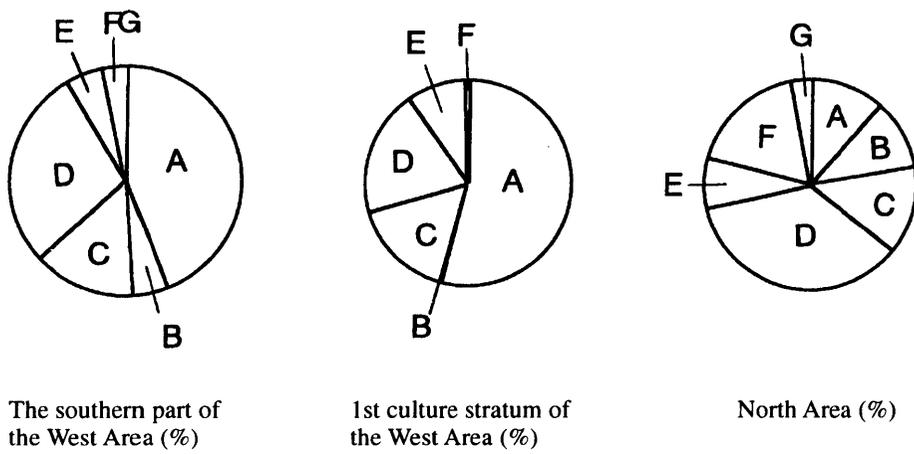


Table 3



manufactured in India, and were brought to al-Ṭūr from the East.⁵⁰⁾

Summarizing the above, and looking at the glass bracelets found at al-Ṭūr from a chronological perspective yields the following results.

14th to 16th century glass bracelets in the Red Sea region are discussed in detail in my papers “Glass Bracelets of the Red Sea Regions During the Mamluk Period” and “Islamic Glass Bracelets Found in the Red Sea Region”.⁵¹⁾ Under the patronage of the Mamluk dynasty, trade flourished, but almost no Egyptian bracelet types found at al-Fuṣṭāṭ have been found at al-Ṭūr, while numerous Palestinian bracelets have been found. The lack of commonality with Quṣayr al-Qadīm and ‘Aidhāb, and the fact that al-Ṭūr began to flourish at the time when these ports were in decline is worthy of notice.

During the 16th to 19th centuries, a variety of products began coming into al-Ṭūr. In addition to the products that had already been arriving from Palestine and Syria, bracelet groups with narrow widths represented by Type F became important. These indicate the relationship with the eastern Islamic world and India, and show that even into the Ottoman Dynasty period trade was conducted with India via the Red Sea. Although they have not been subject to sufficient antiquarian study since the 19th century, an extremely large number of bracelets have been found, and in particular, their relationship with Hebron, the famous glass-manufacturing locale of the time is important. Hebron is an important place of pilgrimage for Jews, Christians and Muslims, and it is not difficult to imagine glass bracelets manufactured in Hebron finding their way along the pilgrimage route to al-Ṭūr, which served as a pilgrimage port. In addition, the increase in the number of flat cross-section bracelets such as Subtype A2, and single-color bracelets such as Type E is important from the perspective of proliferation of roughly made goods. The results given provide clarity to the chronological transition of the Red Sea area, and at the same time provide proof that glass bracelets are an important historical aid in understanding the pilgrimage routes and providing a glimpse at the widespread movement of goods that accompanied commercial activities in the Red Sea region. In the future, I hope to provide even more reliable evidence to support the explanations I have presented here.

Finally, I would like to express my deep gratitude to Mr. Mutsuo Kawatoko, Director of the Middle Eastern Culture Center, Egypt Archaeological Mission, for his many words of advice, and for allowing me free access to unannounced archaeological finds from the al-Ṭūr site.

NOTES

- 1) Spaer 1992.
- 2) Kawatoko 1993, 1994, 1995, 1996, 1997.
- 3) I discussed the archaeological finds from the southern part of the West Area in a paper published in 1997. For this paper, I have added finds from the North Area to the material studied in the short 1997 paper, and reconsidered the findings.

- 4) Shindo 1992, 1993, 1997.
- 5) Carboni 1994. These materials were collected in Upper Egypt, and were in the possession of a private collector from Luxor. Based on comparisons between finds from Qūṣayr al-Qadīm and Khirbet al-Minyeh, Carboni concluded that they are from the Mamluk Dynasty period. According to Meyer, glass bracelets have also been excavated from the Thebes tomb, and a report is currently being prepared.
- 6) Whitcomb 1979, 1982; Meyer 1993, pp.90-94.
- 7) Kawatoko 1993, 1994; Shindo 1996a,b; I would like to express my gratitude to Dr. Rogers and Dr. Ward of the British Museum for their goodwill in allowing me to research these items when I visited the museum in 1995.
- 8) Monod 1975, pp.712-715, Figs. 14-65.
- 9) Lane & Serjent 1948; Doe 1963; Monod 1978; Whitcomb 1988; Shindo 1995, 1996a,b.
- 10) Spaer 1988, 1992; Ariel 1990; Stern 1978; Goldstein 1976; Brosh 1987; Pringle 1986.
- 12) Zouhdi 1974; Riis & Poulsen 1957; Salam-Liebich 1978; Redford 1986; Rice 1952.
- 13) Lamm 1928; Bamber 1988; Ii 1989.
- 14) Stein 1937; Whitehouse 1968; Whitcomb 1985.
- 15) Whitcomb 1978; Saad 1980.
- 16) Taha 1975, Hansmann 1985, Vogt 1991, and Sasaki 1993. I would like to express my gratitude to Mrs. Ursula Binsfeld for her goodwill in allowing me to view the materials from the Rās al-Khaima Museum in 1994.
- 17) Sankalia & Dikshit 1952; Sankalia 1960, 1977; Chaudhuri 1970, 1990; Dikshit 1969; Govind 1970; Masshal 1951; Singh 1989.
- 18) Shindo 1992, Pl. IV-9-2-11; Meyer 1993, Pl. 10: 563, 565.
- 19) Shindo 1996a, Fig.3:9; Meyer 1993, Pl. 20: 554, 555.
- 20) Brosh 1987, p.30, No.24.
- 21) Kock & Sode, pp.14-16.
- 22) Added decoration has an exaggerating effect that makes the basic form of bracelets unclear in some cases. When "core shape" is referred to in this paper, it means the cross-section of a bracelet.
- 23) Mochizuki 1992. Results from analysis performed on similar glass bracelets excavated from al-Ṭūr and similar glass bracelets at the Tokyo Metropolitan Industrial Technology Research Center also concluded that they were made from soda lime glass.
- 24) Spaer combines Type C and Type D into one type called "Multi-colored mosaic decoration". The two types share many common decorative elements, and are closely related. In the case of Type C, reheating is used to marver applied decoration and make the surface of the glass smooth, while in the case of Type D, applied materials are left protruding from the bracelet surface to achieve the decorative effect. Given this, it is clear that the two types are different both in terms of manufacturing technique and appearance of the decoration, and for this reason they are treated as two distinct types in this paper.
- 25) Shindo 1994, 1996a:3; Examples of Subtype A1 are displayed at the Rās al-Khaima museum, and it is said that more examples of Subtype A1 have been found at the Julfar sites than any other type.
- 26) Spaer 1992, Fig. 29 Left.
- 27) Meyer 1993, pp.91-92, Pl. 20: 554-561; Kawatoko 1993, Fig.2: 15, 16; Shindo 1996a, Fig.3:9.
- 28) Shindo 1992, Pl. IV-9-2-8; Spaer 1992, Fig.24:2; Salam-Liebich, GL22; Riis & Poulsen 1957, p.68; Redford 1986, Fig.13:H; Bamber 1988, Fig.54:21; Hansman 1985, Fig.18:J,K,Pl. IV; Taha 1975, Pl. 36; Meyer 1992, Fig.13:jj; Whitcomb 1992, Pl.36:c;

- Whitcomb 1978, Pl. 82:21, 22; Saad 1980, Fig.23:F6a,b; Whitcomb 1985, Pl. 46.
- 29) Spaer 1992, Fig.24a; Shindo 1992, Pl. IV-9-2-9; Ariel 1990, Fig.31:GL34; Redford 1986, Fig.13:G.
 - 30) Shindo 1992, Pl. IV-9-2-10-12; Meyer 1993, Pl. 20: 562-565; Spaer 1992, Figs.23:4, 24:4, Figs.24:3, 25:9; Goldstein 1976: 132; Brosh 1987, Fig.4; Meyer 1992, Fig.13:W, bb; Riis & Poulsen 1957, p.68, Fig.210; Displayed at Rās al-Khaima Museum; Saldern 1980, Pl. 18:98,99; Monod 1978, p.123, Figs.82, 83; Whitcomb 1978, Pl.82:20.
 - 31) Shindo 1992, Pl. IV-9-2-13; Whitcomb 1992, Pl. 36:d, Photo.24.
 - 32) Shindo 1992, Pl. IV-9-3-3 ~ 6,8,9.
 - 33) Spaer 1992 Figs. 16 and 17. Spaer states that these are mostly products from the Ottoman period.
 - 34) Kawatoko 1993, Fig.2:17; Shindo 1996a, Fig.3:10; Ariel 1990, Fig.31:GL35, Fig.193:1; Whitcomb 1988 Fig.21:j,t; Monod 1975, Fig.58.
 - 35) Shindo 1992, Pl.IV-9-3-10, 11; Slem-Liebich 1978, GL22; Whitcomb 1992, Pl. 36:f,g; Meyer 1992, Fig.13:ee; Meyer 1993, Pl. 20:578, 579, 581; Bamber 1988, Fig.54:22; Monod 1975, Fig.25; Spaer 1992, Fig.23:7, 8, Fig.25:15; Hansman 1985, Fig.19:b, c.
 - 36) Spaer 1992, Fig.25:16, Fig.18; Salam-Liebich 1978, GL22; Ettinghausen 1984, Fig.23.
 - 37) Displayed at Rās al-Khaima Museum, Sankalia Pl.36:7, 9, 13.
 - 38) Monod 1975, Figs.18, 24, 27, 29, 30, 31, 34, 35, 40.
 - 39) Spaer 1992, Figs. 11, 12, 14, Fig. 29 left; Meyer 1993, Pl.20:583; Stein 1937, Pl.10: Hus.A.47; Hansmann 1985, Fig. 19:j. Similar items from the 18th century were discovered at Khuzistan in southern Iran, and Hansmann points out that these were of Iranian manufacture.
 - 40) Lamm 1933, Nos. 299, 300; Shindo 1992, Pl.IV-9-3-23; Meyer 1993, Pl. 20:566, 567, 568, 569; Shindo 1996a, Figs.13, 5:9, 10; British Museum No. 1940 12-14, 170; Monod 1978, Fig.17; Whitcomb 1998, Fig.21:ff; Ii, Figs.23: 93, 94, 95, 99, 100. Hansmann considers these to have been manufactured in India between the 16th and 17th centuries.
 - 41) Spaer 1992, Figs.24:6, Fig.28; Meyer Pl. 20:570, 571; Whitcomb 1988, Fig.21:h; Stein 1938, Pl. X:Bam.surf.500.
 - 42) Spaer 1992, Figs.25:17, 18; Stern 1978, Pl. 41:21, 22.
 - 43) Whitcomb 1988, Fig.21:g, dd.
 - 44) Shindo 1992, Pl. IV-9-4-3.
 - 45) Shindo 1992, Pl. IV-9-4-2, 4-8; Meyer 1993, Pl. 20:572; Kawatoko 1993, Fig.2:18; Riis & Poulsen 1957, nos.185, 211; Monod 1978, Figs.1, 4, 5, 12, 16, 74, 76, 77; Whitcomb 1988, Fig.21:e, f, bb, cc, n, y; Whitcomb 1978, Pl. 84:30; Stein 1937, Pl. X:Bam.surf.502, Kumb.A.54.
 - 46) Spaer considers that there is a high possibility that this type was manufactured somewhere other than the Middle East, and excludes them from the Palestinian type classification. However, enough were found at the al-Ṭūr site to justify classification as the 5th type.
 - 47) Shindo 1993, Figs.4-21, Pl. 1-17.
 - 48) Shindo 1996a, Figs.5-14; Sankalia & Dikshit 1952, Pl. 34A.
 - 49) MH 38.115, MH33.165.21. I had an opportunity to see these at the Paris Museum of Anthropology in September, 1997. I wish to express my gratitude to Mrs. Anie Montigny of the North Africa and Middle East Department for arranging this.
 - 50) Hansmann points out that glass bracelets were being made in Bombay at the time, and that they were being decorated with the same type of 'S' and 'X' shapes in white enamel. These are still being sold today at the Rās al-Khaima bazaar. This suggests that the two examples before the al-Mataf discovery were of Bombay origin. As the artifacts from the surface

deposit are from the 16th century to the start of the 17th century, it can be concluded that the two finds at Julfar are from the same period. Given that there are modern examples as well, Hansmann notes the significant view that bracelets using these 'S' and 'X' motifs have been manufactured in India for 400 years.

51) Shindo 1996a, 1996b.

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JGS = Journal of Glass Studies

JRAS = Journal of the Royal Asiatic Society