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PAPERS OF THE MICHIGAN ACADEMY OF
SCIENCE ARTS AND LETTERS

EDITORS

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VOLUME XXXI (1945)

“Pusilla res mundus est nisi in illo
quod quaerat omnis mundus habeat.”
—SENECA, *Naturales Quaestiones*

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A MATTER OF RECORD

Owing to wartime restrictions on travel no meeting of the Academy was held in 1945. The present papers were selected from those on the program that had been arranged before the cancellation of the meeting. The officers for 1945 were continued in office for the following year.

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THE BEAL-STEERE COLLECTION OF POTTERY FROM MARAJÓ ISLAND, BRAZIL*

BETTY J. MEGGERS

MARAJÓ ISLAND is located in the mouth of the Amazon River just south of the equator. It has an area of 14,000 square miles and an average height of three feet above sea level. It is drained by a few rivers and hundreds of small streams, but they are not sufficient to carry off the water during the wet season, and as a result the greater part of the island is flooded. In the dry season everything is parched and cracked, and only the largest rivers still flow. Here and there artificial mounds rise above the level surface of the campo. Since 1870 they have been visited many times by explorers, treasure hunters, and scientists. There has been no systematic archaeological work, however, so that neither the extent nor the chronology of the sites is known.

The most famous of the mounds is Pacoval in Lake Arary (see Fig. 1). It has been visited and ravaged repeatedly, and the profusion and elaborateness of the pottery have impressed all who have seen it. Anyone Costa (p. 78) reports that the first explorations of Pacoval were made by Steere and Ferreira Penna in 1871. On the same trip to Marajó Steere visited another mound called Ilha dos Bichos. He describes these two sites as follows:

They were both on the river Arary, the largest stream in Marajó, which is about as broad as the Huron, but at the time of my visit in the month of May, deep and overflowing its banks. Perhaps thirty miles inland it heads in Lake Arary, which is three or four miles broad, and ten or twelve long. I hired a canoe and boatmen at the village of Cachoeira, on the upper Arary, and we paddled and poled across the open and flooded *campo* eliminating the many loops and curves of the river. The mound, called *Ilha dos Bichos*, island of the beasts, was visible at several miles distance, a solitary projection above the level and flooded plain.

On coming up to it I found it to be about a half-acre in extent, and from fifteen to twenty-five feet in height above the plain. It was covered with trees, and its sides were washed into deep ravines, yet there seemed to be the remains of a ditch or trench, intended perhaps for defense, for building material, or for both. The top was covered thickly with broken bits of pottery and on digging into this deposit I found it of considerable depth. A number of large burial urns showed in the ravines at different levels. These were usually crushed by the caving in of the earth, or by the roots of the trees. They were upright, with straight sides and with large covers shaped like broad-brimmed hats. Both the urns and the covers showed remains of painting in various bands and figures. The human remains were too decayed for examination. In one urn, I found some mineralized fat, and in others, several curious three-cornered shallow dishes with holes in their covers [read "corners"], which appear to have been used as *tangas*, aprons. These were beautifully polished and ornamented. The mound appeared to have been built to a certain height, inhabited, and the dead buried beneath. Then, after a time, another layer of earth and another period of occupation was added. Two of

these levels showed paving of burned clay, which was covered with ashes, charcoal, and broken pottery. I could get nothing in the village in the line of digging tools but a slave's heavy hoe and a crowbar, yet I was able to secure one of the urns and its broad overhanging cover in a fair state of preservation.

The second mound visited was called *Paccoral*, banana island. It is situated in the present border of the lake. At the time of my visit it was about a hundred feet in diameter with its top not more than ten or twelve feet above water level, and was being washed down continually. It appeared to have been much larger for the lake about it was full of pieces of pottery, among them some entire dishes which my canoe men fished out with their bare feet. The mound contained burial urns similar to those of the *Ilha dos Bichos*.¹

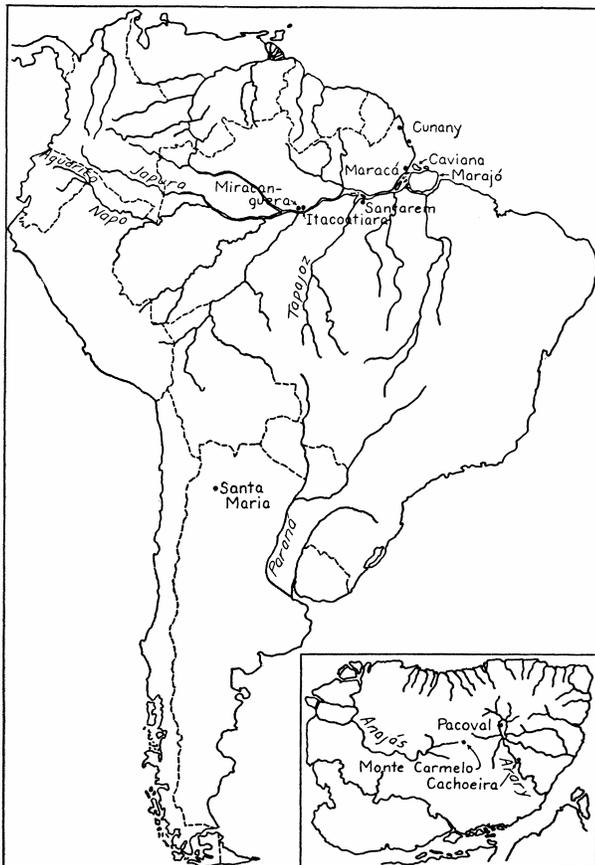


FIG. 1. Archaeological sites in the Amazon basin. An enlargement of Marajó Island is shown in the inset

This paper is a description of the pottery that Steere collected from these mounds and an attempt to provide a series of categories that can be used in determining the distribution and chronological sequence of Marajó ceramics. The collection includes fifteen whole or nearly complete vessels, sixteen large sherds and fragmentary vessels, twelve figurine parts and adornos, and five tangas² and fragments. All but two whole vessels show some deterioration of slip and paint. In a few specimens this has proceeded so far that only traces of the slip are visible, and the original hardness, texture, and luster could not be ascertained. It is possible to say that red paint was present on several specimens, but no indication of the decorative pattern can be given. The two well-preserved examples, one with red and one with

white slip, show a very smooth surface with low luster, a condition that may formerly have been true for some of the others.

The classification was made on the basis of surface finish, the primary criterion being slip, the secondary one, mode of decoration. The following types are represented, with the number of examples of each type in the collection indicated in parentheses:

Plain

- Undecorated (3)
- Incised (4)

Red-slipped

- Simple-incised (3)
- Complicated-incised (1)
- Champlevé (2)

White-slipped

- Incised
 - Unretouched (1)
 - Red-retouched (2)
- Champlevé (1)
- Painted
 - Red on white (8)
 - Polychrome (red and brown) (4)

Double-slipped (red over white)

- Incised (1)
- Champlevé (1)

A classification which produces so large a number of categories that many are represented by a single vessel or sherd may require some justification. An examination of the collections at the University Museum, University of Pennsylvania, and the American Museum of Natural History indicates that this is the result of the collector's selection rather than of the impossibility of finding more than one example, since these styles are represented in greater number in the larger collections.

Inasmuch as some vessels show two different slips or types of decoration, one on the interior and one on the exterior, this is not a satisfactory classification for entire vessels. On the basis of the Steere collection, however, it was not possible to demonstrate any significant differences which would justify a grouping in terms of temper or paste. Paste color seems to be dependent on the thickness of the vessel wall and the thoroughness of firing. Thin walls are generally fired orange all the way through, whereas thicker ones may be orange only on the surface or a few millimeters in. Conditions were not constant for all parts of a vessel, so that different areas often show wide color variation. Temper was generally sherd. Examination was macroscopic, and visibility depended to some extent on the color to which the paste was fired. In a few of the orange-fired vessels it was not possible to see any temper. In others the temper granules were large and stood out in contrast to the gray paste. In four specimens (two red on white and two polychrome) temper grains with a white slip and traces of red paint were visible. Gray inclusions were often noted, but their composition was not determined. They showed the same size range as the sherd, and were generally significantly lighter in color than the gray paste.

Linné (1925, pp. 42-43) reports that a microscopic examination of Marajó pottery showed the presence of silicon compounds resulting from the admixture of ash of tree bark. He states that the composition of the clay in the banks of the Amazon River is such that it is not usable unless some siliceous substance is added. This material may well have been present in the sherds described here, but it could not be detected macroscopically.

The terms used to label the different decorative techniques may be defined as follows:

Plain. — No decorative pattern is present. A single or a double incised line is sometimes drawn on the rim or at the junction of two parts of a vessel, such as that of the neck with the body of a jar.

Simple-incised. — Designs are produced by deep, shallow, wide, and (or) narrow incised lines (varying intentionally or unintentionally). These may or may not go through the slip to the underlying surface. In the plain-incised, large punctates and small furrowed areas similar in execution to the cruder red champlevé occur. The patterns are all simple with plain backgrounds.

Complicated-incised. — A simple design of plain bands, often meeting at right angles and ending in points, stands out against an intricately incised or crosshatched background.

Champlévé. — The background of the design is cut away, which leaves the pattern at the original surface and gives the effect of relief. The cutout areas are (1) striated or scarfed, with the lines parallel to the shortest axis of the cut; (2) smoothed; (3) extremely rough and irregular, sometimes furrowed in appearance as though gouged out by a blunt instrument. The surface may be single-slipped, with the background cut through the slip to the original surface and left plain or covered with a white slip, or the surface may be double-slipped, with the background cut through the upper slip to reveal the lower one. In all three types a color contrast is produced. Linné (1925, pp. 141-142) believes that this technique is related to the cloisonné or encaustic ware of the Valley of Mexico and adjacent regions.

Red-retouched. — Red is applied to wide incised lines or to small spaces enclosed by narrow incised lines.

Painted and incised designs are geometric. A few elements were used repeatedly, and of these the spiral is by far the most common. Spirals are single or interlocking, and in shape are square, round, elongated, or triangular. In interlocking spirals the two components may be alike or different. Spirals occur on all types in this collection except the red complicated-incised and those with double slip. The T-form and forms based on it are used on the red champlévé, red on white, and polychrome. This motif is apparently derived from the stylized representation of the eyebrows and nose on anthropomorphic faces commonly used in decoration. Relief and modeled anthropomorphic and zoomorphic heads were used as appliqué and as rim adornos. Floral motifs are not found in the Amazon area.

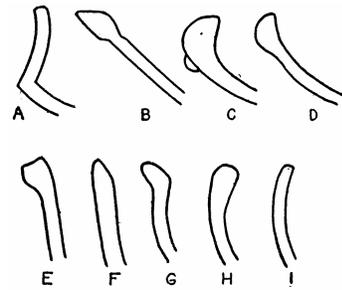


FIG. 2. Bowl-rim profiles. A-B, plain incised; C, white champlévé; D-E, white incised, red-retouched; F, red on white; G, plain; H, white incised; I, polychrome

In the following classification color numbers are those of Ridgway's *Color Standards and Color Nomenclature*; hardness numbers refer to mineral hardness standards (3, calcite; 4, fluorite). Numbers in parentheses are catalog numbers of the University of Michigan Museum of Anthropology.

DESCRIPTION OF TYPES

PLAIN

Paste

Color: Light-gray center, edges fired orange at least 1 mm. from surface.

Temper: Very coarse sherd (1 mm. and above). One specimen shows gray particles to 5 mm. in length.

Surface finish

Color: Various shades from dark brown to red orange (both extremes restricted). One vessel is 13" (orange cinnamon) to 13" *i* (mikado brown).

Texture: Sometimes smoothed and showing minute parallel lines of smoothing tool. Irregularities remain, and the lower parts of the exterior are often quite rough.

Coarse crackle on bottom of interior.

Hardness: 3.

Slip: None.

Decoration

Occasionally one or two shallow incised lines on top of rim or around base of neck.

Vessel types

1. Trianguloid bowl, flattened bottom, rim not level. Dia. 22-22½ cm.; depth c. 9 cm. (6391. Fig. 2G)
2. Jar, globular body, slightly constricted neck, everted rim, flattened bottom. Rim dia. 11-11½ cm.; height 13 cm.; greatest dia. of body 13½ cm. (6400. Pl. I, Fig. 1)
3. Jar, globular body, base inverted truncated cone, narrow neck concave in profile and joining body at pronounced shoulder, everted rim (broken off). Existing height 34 cm.; base dia. 19.5 cm.; greatest dia. of body c. 31 cm.; minimum dia. of neck 9.5 cm. (7481. Cf. Kidder II, 1944, Fig. 20, No. 1.)

PLAIN INCISED

Paste

Color: In general, fired same color as surface. Sporadic gray areas in center of cross section and approximately pale neutral gray through the cross section in places.

Temper: Possibly sherd. The grains are comparatively small, and the paste is fired approximately the same color, which makes them very difficult to see. One specimen has minute light-gray particles and minute holes.

Surface finish

Color: Exterior: 11" (vinaceous tawny), 13" *i* (mikado brown), 13' *d* (light ochraceous-salmon); exterior and interior; 15" *b* (pinkish cinnamon); interior: 13"^u to 13"^u *b* (fawn color to vinaceous fawn), 17"^u *b* (avellaneous).

Texture: Interior and decorated area on exterior smoothed. Rest uneven. Coarse crazing on interior.

Hardness: 3.

Slip: None.

Decoration

1. Elongated incised spirals separated by gouged-out areas resembling furrowed champlévé background. On one specimen the spirals are separated by a square with the four corners gouged out to form a cross.
2. Incised lines alternating with rows of irregular pits.
3. Division into vertical panels. Rows of dashes and scallops. Entire design executed with double lines.

Vessel types

1. Bowl, carinated, collar-like vertical rim. Rim height 6 and 4.1 cm.; thickness of wall 1.95 and 0.7 cm. (6372, 6377. Fig. 2 A; Pl. II, Figs. 4-5)
2. Bowl or platter, shallow. Thickness of wall 0.8 cm. (6376. Fig. 2B)
3. Jar, globular, round bottom, everted rim. Maximum dia. c. 27 cm.; interior dia. of mouth 15.5 cm.; height 22 cm. (7400)

RED SIMPLE-INCISED

Paste

Color: About *6 gray (dark gull gray), fired orange 0.5 to 3 mm. from surface.

Temper: Inclusions gray and light orange to bright orange (13"^u *b*). To 4 mm. in size, average about 2 mm. Numerous, especially those less than 1 mm.

Surface finish

Color: Interior and exterior under slip 13"^u *a-c*.

Texture: Smoothed and showing marks of tool. Coarse crackle on interior.

Hardness: 3.

Slip

Color: One sherd 5" *i* (ocher red); other two 7" (terra cotta), 7" *i* (vinaceous russet) and 3" *i* (deep Corinthian red), with 9" *b* (Japan rose) film in incisions.

Texture: Smooth, sometimes showing tool marks. Some flaws.

Hardness: 3.

Luster: None at present.

Decoration

Incised lines 1 to 3 mm. wide. These are sometimes very shallow, at other times deep and showing parallel scratches made by the end of the tool. The pattern is simple, being composed of straight parallel lines and combinations into concentric triangles and circles, right angles, squared-spiral.

Vessel types

The three body sherds are evidently from similar large bowls with vertical sides. All curve inward below the

design area. Thickness 1.15 cm. above bend; 1.6 cm. at bend. (6378, 7484. Pl. II, Fig. 3)

RED COMPLICATED-INCISED (Netto, 1885, Pl. 5B, Fig. 9 and pp. 395, 397; Torres, 1940, Pls. 34-35)

Paste

Color: 15"^u *b-i* (light mouse gray—deep mouse gray).

Temper: Sherd to 7 mm. in size, majority 1-2 mm.; color 13" (orange cinnamon).

Surface finish

Color: 13" *i* (mikado brown) to 13"^u (cinnamon drab). Interior light neutral gray to dark neutral gray.

Texture: Interior: coarse crackle, parallel lines of smoothing tool concentric with rim. Exterior: fine scratches on one half of disc surface.

Hardness: 3.

Slip

Color: 71" *k* (neutral red).

Texture

Hardness

Luster

Only traces remain on incised disc, edge of disc, and sides of base

Decoration

Symmetrical pattern incised with crosshatched background on face of disc. Alternation of three vertical lines with ellipsoid on sides of base.

Vessel types

Flat disc raised on a flaring annular base. This is identical in shape with the so-called "stools," which are about 17 cm. in dia. Disc dia. 10.4 cm.; base dia. 9.6 cm. (outside); dia. at junction 7.8 cm.; height 3.8 cm. (7486)

RED CHAMPLÉVÉ (Nordenskiöld, 1930, Pls. 1, 4, 10, 11, 12; Torres, 1940, Pls. 2, 8, 10, 18, 21, 25)

Paste

Color: (1) Brownish gray, fired orange to 2 mm. from exterior surface. (2) About *6 gray (dark gull gray), no firing discoloration except on immediate surface.

Temper: Orange sherd not visible. Gray inclusions occasionally 3 mm. in dia., generally about 1 mm.; not easily visible.

Surface finish

Color: 13' *d* (light ochraceous salmon), 7" (terra cotta), 12" (unnamed).

Texture: Smoothed.

Hardness: 3.

Slip

Color: 9" *j* (unnamed), 11" *i* (pecan brown).

Texture: Smooth. Faint marks parallel to rim visible.

Hardness: 3.

Luster: Low.

Decoration

Body

1. Divided into vertical panels separated by incised lines and low relief band. Nonsymmetrical geometric design in each panel with champlévé and incised lines. Cutout: rough, irregular furrows, irregular depth, white filling shows crackle.
2. Continuous pattern alternating two motifs, each of which appears four times in the circumference. One motif divided horizontally into two stylized faces, lower one inverted.

Rim

Relief decoration on outer edge of bosses or trianguloid faces.

Vessel types

Semicylindrical jar increasing slightly in diameter from base to below everted rim. Height of complete specimen 13.2 cm.; rim dia. 16 cm. (6374, 7413. Pl. I, Fig. 2)

WHITE INCISED

(a) UNRETOUCHED (Nordenskiöld, 1930, Pl. 3?; Torres, 1940, Pl. 31).

Paste

Color: Whole vessel.

Temper: Whole vessel.

Surface finish

Color: About 9' *k* (kaiser brown) at rim. Some areas more red orange.

Texture: Smooth.

Hardness: 3.

Slip

Color: White.

Texture: Originally apparently smooth.

Hardness: 3.

Luster: None at present.

Decoration

Fine and broad incisions, the former shallow and the latter deep and showing the orange paste. Pattern of pairs of spirals. Low relief boss.

Vessel types

Bowl, oval, round bottom, convex (from exterior) sides, flat rim. Dia. 14 X 12.7 cm.; depth 5.2 cm.; rim thickness 1 cm. (7412, Fig. 2H)

(b) RED-RETOUCHED (Netto, 1885: Pl. 5, Fig. 13; Pl. 5 A, Fig. 5)

Paste

Color: About *6 gray (dark gull gray). Fired orange 0.2 to 3 mm. from surface.

Temper: Gray inclusions to 5 mm. long, generally 1 mm.

Surface finish

Color: Various shades of brown and tan. Blackened areas.

Texture: Parallel scratches as though brushed. (1) Well smoothed; (2) many irregularities remain.

Hardness: 3.

Slip

Color: White

Texture: (1) Very smooth; (2) small pits present, otherwise well smoothed.

Hardness: 3.

Luster: Low.

Decoration

1. Divided into four lateral (opposite two alike, ratio of area $\frac{1}{6}:\frac{2}{6}:\frac{1}{6}:\frac{2}{6}$) and one central section. Various types of interlocking spirals.
2. Division into two (possibly four) design areas, opposite two alike. One section of three concentric, archlike bands composed of S's of parallel lines enclosed in semiovals and placed end to end separated by a band of equal width that is plain except for a single wide incised line down the center. Other section contains interlocking spirals.

Vessel types

1. Bowl, rim thickened on exterior, round bottom. Rim dia. 15.3-15.8 cm.; depth about 4.6 cm.; thickness 0.8 cm. (6389, Fig. 2D)
2. Bowl, exterior rim thickening. Original dia. c. 41 cm.; original depth c. 12? cm.; thickness 1.3 cm. (6379, Fig. 2E)

WHITE CHAMPLEVÉ

Paste

Color: Fired uniformly orange.

Temper: Sherd difficult to see because of similarity to paste color. Also present are dark red semispherical bodies to 2.5 mm. in dia. Four protrude above the general level of the exterior surface, and smaller ones are also visible on the interior.

Surface finish

Color: 11" *a* (unnamed).

Texture: Smoother than slip, slightly gritty.

Hardness: 3.

Slip

Color: White.

Texture: Gritty because sand grains protrude or have fallen out and left holes.

Hardness: 3.

Luster: None.

Decoration

Two panels visible, one incised, other with shallow excised background gouged in places but often relatively smooth. Round boss on exterior where wall begins to curve inward. Incised panel: two squared spirals one above the other. Excised panel: somewhat circular areas containing two parallel short incised lines and separated by depressed area.

Vessel types

Bowl, shallow, thickened at rim. Maximum thickness (rim) 1.5 cm.; body wall thickness 0.8-0.9 cm. (7484, 6382, Fig. 2C; Pl. II, Fig. 1)

RED ON WHITE (Nordenskiöld, 1930, Pl. 7; Netto, 1885, Pl. 1, Fig. 1)

Paste

Color: Fired orange through in places (c. 11", vinaceous tawny). Other sherds have a medium gray center and are fired orange on the immediate surface or to 2 mm. in. Temper: Sherd to 3 mm. in dia. Some of the granules show white slip with red paint. One vessel has gray inclusions to 2 mm. in dia.

Surface finish

Color: 11" (vinaceous tawny) to 11" *i* (pecan brown). Also 11" *a*.

Texture: Distinct marks of smoothing tool concentric with rim. One specimen shows coarse crackle. Bottom of exterior often remains rough.

Hardness: 3.

Slip

Color: White to cream.

Texture: Smooth. Marks of smoothing tool rarely visible.

Hardness: 3 + or 4 -.

Luster: None at present.

Paint

Color: About 7" *i* (vinaceous russet), 3" *i* (deep Corinthian red), 5" *i* (ocher red).

Decoration

1. Divided into four panels, $\frac{1}{6}:\frac{2}{6}:\frac{1}{6}:\frac{2}{6}$; opposite two alike. Interlocking spirals, concentric triangles.
2. Divided into six panels approximately equal in area; opposite two alike. Interlocking spirals, stepped lines, crosshatched areas, T-motif.
3. Divided by an undulating line into scallop-shaped areas containing T- or L- motif.
4. Alternating bands of vertical and slanting (to left) lines, between which are solid red right triangles. Limited to exterior of bowls with vertical sides.
5. Concentric lines leaving elongated areas, which are filled with wavy lines alternating three horizontal and

three vertical to outline. Occasional trianguloid solid areas. No special orientation to rim.

6. Indentations on lower exterior edge of rim of burial urn covers made by pressing in (with thumb?).

Vessel types

1. Bowl, flat bottom, vertical sides. Rim dia. 15 to 20.5 cm.; depth 7 to 10 cm. (6402, 6404, 7484. Fig. 2F)
2. Miniature bowl, oval, flat bottom, convex (from exterior), earlike projections upward at two opposite sides of rim. Dia. 10 X 8.1 cm.; maximum height 4 cm., minimum 2.7 cm.; thickness 0.7 cm. (6410)
3. Bowl, wide, shallow, flat base, sides outflaring, exterior rim thickening. Dia. 31 cm.; depth 9 cm.; base dia. 9.5 cm. (7450)
4. Burial urn cover, deep bowl-like center, wide trough-like rim, flaring annular base. Dia. 40-45 cm.; bowl depth 6-8 cm.; rim width 12-15 cm.; base dia. 16 cm, (7476, 7477). Specimen 7476 shows five pairs of pierced holes along breaks, indicating that the vessel was broken and repaired by the users. (Netto, 1885, pp. 339, 340)

POLYCHROME (Torres, 1940, Pl. 19)

Paste

Color: Dark gray or brown-gray center, fired orange on surface and in the thicker-walled vessels to 5 mm. in.
Temper: Sherd to 3 mm. in dia., majority about 1 mm.
Grains about 2 mm. long, showing white slip, are visible on the unslipped surface of one. Also gray inclusions in latter to 2 mm. long.

Surface finish

Color: About 9" *j* (unnamed).
Texture: Gritty. Superficially smoothed.
Hardness: 3.

Slip

Color: Off white.
Texture: Smooth. Parallel marks of tool sometimes visible; occasional coarse crackle.
Hardness: 3 + (average).
Luster: None at present.

Paint

Color: Red: 5" *i* (ocher red), c. 5" *k* (brick red). Brown: c. 13" *j*, c. 13" *j* (both unnamed).

Decoration

1. Interior divided by cross of two parallel red lines into four sections. Brown **V** in each with point toward center; interior edge serrated.
2. Circular outline in bottom, undulating line around sides forming scallops, which are filled with a brown design with serrates, except one that contains the outline of a four-footed animal.

Vessel types

1. Double bowl, **D**-shaped vessel broken off on all sides; straight side forms partition between two parts of vessel (missing one apparently larger). Dia. of bowl 7.7 X 5.8 cm.; thickness of partition 1.1 cm.; depth 3.5 cm. (6408)
2. Bowl, flattened bottom. Original dia. about 18 cm.; depth about 7 cm. (7418. Fig. 21)
3. Sherd, part of neck of large burial urn? Thickness 1.5-2.1 cm. (7484)

DOUBLE-SLIPPED INCISED

Paste

Color: Similar to that of red slip.
Temper: Sherd?

Surface finish

Color: c. 11" *b* (onion-skin pink).
Texture: Gritty, uneven.
Hardness: 3.

Slip

Color: Brown red, some places dark brown, over white.
Texture: Both smooth.
Hardness: Red, 3. White, 3 + or 4 -.
Luster: None at present.

Decoration

Double-slipped to chin level; below this incised white, red-retouched. Incisions in double-slipped area not consistently through to white. Fine incised lines outlining features; concentric triangles on forehead. Below neck, surface divided into rectangular conventionalized representations of human face; eyes small ovals or rectangles, nose and mouth horizontal and vertical lines joined, small rectangle in each lower corner, all of these red-filled.

Vessel types

Neck of vessel composed of two faces sharing a single pair of ears. Mouth of vessel at top of head. Round knob for nose, eyes lower round prominences, ears double prominences, arched eyebrows come together over nose. Dia. of orifice about 4 cm.; height from top to end of red slip on neck 4.5 cm.; greatest dia. (nose to nose) 8.6 cm.; thickness about 0.5 cm. (7447. Cf. Netto, 1885, pp. 307, 309.)

DOUBLE-SLIPPED CHAMPLEVÉ

Paste

Color: Tan; orange on inner edge for 1-2 mm. in.
Temper: Sherd to 3 mm. long; majority about 1 mm.

Surface finish

Color: Light orange.
Texture: Smooth.
Hardness: 3.

Slip

Color: Red (about 5" *i*, vinaceous brown) over white.
Texture: Both smooth. Fine crackle on interior and parts of exterior.
Hardness: 3.
Luster: None.

Decoration

Red slip on raised areas; white under it and showing on excised areas. In some places excised through to original orange surface.

Vessel types

Body sherd, thickness 1-1.2 cm. (7433. Pl. II, Fig. 2)

ADORNOS

APPLIQUÉ

1. Anthropomorphic head, hollow hemisphere. Thick white slip. **Y**-eyebrows and nose. Eyes and mouth hemispherical prominences with shallow pit in center. Another on top of head. No ears. Features outlined with wide incision painted red. (7448. Pl. III, Fig. 4)
2. Zoomorphic head. Traces of red slip on face. Neck hollow. Trianguloid head, ears in upper corners, protruding mouth, **Y**-eyebrows and nose. Eyes round, deep-punctate, raised rim. (7441)

One seated anthropomorphic figure and two heads are represented. All are solid, unslipped, and undecorated. Color, temper, and texture are similar to those of the plain vessels.

1. Seated figure. Round head and globular body. Features of face and arms in relief. T-eyebrows and nose widened at tip with nostrils indicated by holes. Coffee-bean eyes, protruding mouth. Double ear prominences rather far apart. Arms indicated by ridge straight down from prominent shoulder to elbow and then forward at right angle, ending in three fingers. Two small prominences at breasts. Two knobs one above the other on middle of back. Height 11.7 cm.; body dia. 8 cm. (7425. Pl. III, Figs. 1-2)
2. Trianguloid head rising above rim and inclining toward interior of vessel. Hole pierced from exterior just above rim; through to interior in Type *a*, incomplete in Type *b* (Netto, 1885, pp. 393, 394).
 - (a) Anthropomorphic. Y-eyebrows and nose with bulbous tip (similar to Type *b* figurine head). Coffee-bean eyes, similar mouth. Bulging forehead. (7429. Pl. III, Fig. 3)
 - (b) Zoomorphic. Frog. Eyes hemispherical prominences, one with hole in center. Relief line on each side of top of head, extended forward around eyes, and connected at back of head by cross ridge. (7420)

FIGURINES

There are six incomplete figurines in the collection: two heads broken off at the neck; one head and upper body (broken off about the waist); one torso; two seated figurines without heads. All are hollow, except one that is miniature, and all are white-slipped. Decoration is painted: red on white or polychrome. Temper is sherd, and fragments with white slip and red paint are visible in the paste of the torso. In two the coils used in construction are clearly visible on the interior.

The following types are represented:

1. Head (Netto, 1885, 20 pls., pp. 273-311)
 - (a) Forward projection on forehead like pointed cap. Y-eyebrows and nose widened laterally at tip. Eyes oval relief. Mouth projecting oval. Dislike ears stand out at sides of head and are pierced from back and front but not through. Features outlined conventionally (see Netto, 1885, Pl. 2, Fig. 8; Pl. 4, Fig. 32), with incised line accented with red paint. Triangular section from tip of forehead projection to back of neck painted red and flanked by two grooves. Height 9.6 cm.; width at ears 11.6 cm. (7421. Pl. IV, Figs. 3-4)
 - (b) Cylindrical or widening at cheek. High forehead. Hair conventionally done with projection like a high comb at crown and lower back, and red-slipped. Eyebrows joined to nose, which is bulbous. Eyes and mouth low oval relief or slight horizontal groove. Ears two small prominences, one above the other, connected at back by low ridge or by conventional painted outline. Height 10.6 cm. (see Torres, 1940, Pl. 44). (6406, 7414. Pl. IV, Figs. 1-2)
2. Body
 - (a) Arms represented by short horizontal extensions from the shoulder. Breasts in low relief (7414. Torres, 1940, Pl. 44)
 - (b) Right arm extended forward along body, left raised. Polychrome all-over design. (7438)
 - (c) Seated style, V-base, rounded knees, foot indicated by notches or slight projection at base. Arms represented by small lateral conical projections at shoulders. Red on white all over design of concentric triangles and polygons. Height of larger one, base to neck, 11 cm. (7423, 7443)

Two complete specimens and three fragments are present. Three have a white slip, one with traces of red design (7426) and another with horizontal light orange bands (7435). One fragment (7434) is covered with a red (about 5" *j*) slip and has no decoration. The fifth (7500) has a very dark brown or black surface covered on the exterior with a cream paint (?). The cross section is black or tan and shows finely ground sherd temper. Paste color is not correlated with differences in color of slip. Thickness ranges from 0.3 to 0.8 cm. Width averages 12-15 cm., height about 10.7 cm. (Hartt, 1876, Pls. 3-5; Nordenskiöld, 1930, Pl. 16; Torres, 1940, Pls. 29-30)

STRATIGRAPHY

Whether Pacoval is stratified or not is uncertain. Steere and Penna were able to distinguish different levels. The latter writes (p. 52):

My first visit to the mound of Pacoval was preceded by that of Dr. Steere. This naturalist has informed me that he distinguished in Pacoval three sections or layers of vessels, superimposed and each one containing artifacts which were sensibly different in design and other ornaments, the most perfect examples being in the lowest section and the least important in the upper one.

This fact appeared to me of great interest and on my visit to Pacoval I had the satisfaction of seeing it confirmed, except that there seemed to me to be two intermediate layers instead of only one

According to Derby,³ however, "All the objects, plain as well as ornamented, were encountered near the surface, and in the middle and lower parts of the mound so that it does not seem possible to establish divisions in the deposit." Lange (p. 322) also saw no evidence of stratification. This disagreement may be the result of inadequate excavation or of the eroded condition of the mound or of both. In any case we have no data that can be considered definite.

Stratigraphy has been noted by Holdridge (p. 72)⁴ at Monte Carmelo, located near the source of the Rio Anajas and southwest of Pacoval. Here "fragments of pottery were exposed from the river bed to the top. At both top and bottom there were quantities of simple red pottery, some of it incised, some of it not. Between these two layers was the highly developed ware, incised, sculptured, and painted, which is characteristic of Marajó. Such excavations as I made tended to confirm the impression that three separate strata existed." This series is different from the one found by Steere and Penna at Pacoval. Before much significance is attached to this discrepancy, it must be recognized that none of the investigators used archaeological techniques that would be considered adequate by modern standards.

COMPARISONS WITH OTHER AREAS

What is known of spatial relationships may be summarized as follows: On the basis of our present information we can distinguish two main centers of culture in the Amazon Valley, one on Marajó and the other with its nucleus at Santarem.⁵ Marajó is characterized by the presence of (a) artificial mounds; (b) urn burial; (c) pottery vessels in which incised and painted decoration in geometric motifs is predominant though often supplemented by low relief or appliqué, especially near the rim; (d) figurines in which the eyebrows and nose are joined in the shape of a Y or a T and in which the ears, mouth and eyes are often emphasized with a conventional outline; and (e) tangas. At Santarem both mounds and urn burial are absent. In the pottery vessels the emphasis is on form and appliqué, although incised and painted decoration occur. Concentric vessels, caryatids, and lobed vessels all profusely ornamented with bird and animal figures in the full round are characteristic. Figurines often have a headdress resembling a diadem, an oblong nose, and eyes indicated by a horizontal ribbon of clay or of the coffee-bean type. Zoomorphic heads are abundant and highly conventionalized.⁶

Aside from these two areas, both of which are represented by large collections in museums, the archaeology of the Amazon is little known. Illustrations of isolated vessels from the Upper Amazon are scattered through the literature.⁷ An anthropomorphic urn reproduced by Nordenskiöld (Pl. 55) from the Rio Napo and a vessel from the Rio Aguarico described by Gillin⁸ show remarkable similarities to those from Marajó. Another anthropomorphic urn from the Rio Napo⁹ corresponds closely to the tubular Maracá type. Urns from the Rio Japura,¹⁰ Itacoatiara,¹¹ and Miracanguera¹² are reminiscent of the styles at the mouth of the Amazon.

The pottery from Caviana, Maracá, and Brazilian Guiana shows a number of affinities to that of Marajó in abstracted traits, such as the presence of funerary urns, painted geometric designs, and the joining of the eyebrows to the nose in anthropomorphic faces, but the actual designs and vessel shapes are usually quite different.¹³ The presence of European trade objects makes it possible to state that these civilizations were flourishing in post-Columbian times.

Evidence from the Guianas is meager, but the "old-time pottery heads and figurines" illustrated by Roth (Pls. 23-26) closely resemble Santarem types and, except for the T-eyebrows and nose on one head, show none of the typical Marajó characteristics.

Linné (1937, p. 30) lists a number of features that are common to Venezuela and the lower Amazon. "These are: secondary urn-burial, four-footed animal figures on urn lids, tripod vessels, ring-based vessels, vessels with solid true-ring circular base, Atlantean supports, vessels with a number of perforations made in their manufacture, or with hollow rims, and, in addition, a large number of

correspondences in decorative — usually plastic — details." Osgood and Howard (pp. 144-145) have noted combinations of traits in the Lower and Middle Orinoco Phases in Venezuela which "suggest connections with Amazon River sites." Adornos from La Mata, illustrated by Bennett (Fig. 9), resemble closely examples from Santarem.

Attention has been called several times to the similarities, some of which are striking, between pottery from Santarem and that from the Caribbean Islands.¹⁴ Rouse (p. 65), on the other hand, has classified the West Indian pottery into four types, the earliest of which he calls Cuevas. "The pottery in northeastern South America which seems most similar to the Cuevas type is that from the island of Marajó at the mouth of the Amazon." This statement is based on the fact that sixteen of the twenty-three characteristics listed for the Cuevas type occur also on Marajó and Guiana pottery. "They are: bell-shape of bowl, flat bottoms, annular bases, everted rims, triangular rim tops, ornamentation after the clay was completely dry, ornamentation on any part of the vessel, affixation, painted-modelled lugs, incision after the clay was completely dry, spiral-incised design, incision filled with paint, red slip applied before firing, negative painted designs, polychrome designs, modelling" (*ibid.*, p. 67). The actual correspondence is not so close as the number of characteristics in common would seem to indicate. Rouse's purpose was to establish a connection not with Marajó in particular but with the South American continent in general and, as he points out (p. 68), "West Indian pottery types have been compared with actual features of pottery in North and South America, not with types of pottery in those two regions." The spiral-incised design, for instance, also occurs in Veracruz, Mexico,¹⁵ and in Chile and northern Argentina.¹⁶ Annular bases are as common at Santarem as on Marajó, if not more so, and this is also true of affixation.

The question of Peruvian and Central American influence on Amazon cultures has been discussed by Nordenskiöld (pp. 2, 32-34) and others, but too little is known of the intervening areas to permit any definite statements. Recently Tello (p. 152) has seen resemblances between sherds found at Chavín sites and Amazon pottery.

In northern Argentina and southern Brazil the pottery is in general simpler and the decoration cruder than it is in the northern half of the continent. However, Nordenskiöld (Fig. 8, p. 31) has noted a resemblance between an urn from Santa Maria, Catamarca, and one from Cunany on the Brazilian Guiana coast. Metraux (pp. 182-183) makes the following comment on the similarities between the two areas:

The many zoomorphic and anthropomorphic vessel appliquéés which have been found in the Paraná delta recall the appliquéés of the same type which have been brought to light in Amazon and Guiana sites. . . . Of course, this resemblance does not extend to details. It is confined to the simple statement of the existence in these two regions of ceramics provided with zoomorphic and anthropomorphic appliquéés placed on the rim

of the vessel. There has also been found in the Paraná basin, on the left bank of the Paraná-guazú opposite Botijas Island, a fragment of pottery incised in the Amazonian style.

There is disagreement over the relative ages of the ceramic types exemplified by Marajó and Santarem. According to Nordenskiöld (p. 34), "In the Amazon area the evolution of ceramic art is characterized by the transition from modeled decoration (human and animal heads), interlacing lines and incised designs to painted ornamentation." Since painted decoration is rare at Santarem and common on Marajó, this would make Marajó culture the more recent. Such a conclusion is open to serious question on a number of scores. Descriptions of the Tapajó Indians are found in many reports of early travelers on the Amazon,¹⁷ and indicate a nourishing culture in the sixteenth century. Very little mention is made of Marajó, although this would seem remarkable if the highly developed society implied by the elaborate pottery and numerous mounds were functioning. What is known of the archaeology also fails to show the contemporaneity of the mound culture with the advent of the Europeans. Holdridge (p. 72) remarks that "There never has been found in the graves a single article of European manufacture and almost the first things the American races got from the whites were Venetian glass beads. Being practically indestructible and articles of personal adornment, they are almost always found in the burial urns of people who had contact with the invaders." What little evidence we have of distributions seems to indicate that the typical Marajó characteristics (urn burial, painted pottery, spirals, joining of nose and eyebrows, and so forth) are extremely widespread in the Amazon area, whereas the Tapajó style shows strong affiliations only with the north and in view of its central position and the importance of the watercourse as a means of transportation, has remarkably little in common with the Upper and Lower Amazon. Although it is possible that more extensive search may change this picture, such work as Nimuendajú has done has apparently established the limits of the Tapajó area in the east, west, and south.¹⁸ Another possible method of determining the relationship is by comparison with areas where chronology has been fixed. Thus Nordenskiöld (pp. 33-34) has shown how a correlation might be possible with the Andean area, and Rouse¹⁹ suggests ". . . we might be able to equate Marajó pottery in Brazil with Cuevas pottery in Puerto Rico, and Santarem pottery in Brazil with Carrier pottery in Puerto Rico. And if this were possible, then Marajó pottery in Brazil would be earlier than Santarem pottery, for we have stratigraphic evidence from at least eight sites in Puerto Rico that Cuevas pottery is earlier than Carrier."

These few paragraphs have served mainly to raise problems and to reveal the meagerness and indefiniteness of our knowledge of the archaeology of South America east of the Andes. Much work will be necessary before the origin, distribution, and chronological relationships of the main pottery complexes can be demonstrated. It is to be hoped that

archaeologists will turn their attention to this area in the near future.

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* I should like to thank the University Museum, University of Pennsylvania, the United States National Museum, and the Buffalo Museum of Science for loan collections of sherds from Marajó and Santarem. I am greatly indebted to Junius Bird for showing me the Marajó collection at the American Museum of Natural History and for loaning me his classification (unpublished) of the types, and to James B. Griffin for his suggestions and criticism.

¹ Steere, pp. 22-23.

² Tangas are thin, triangular, concavo-convex objects that have a pierced hole in each corner. They were worn by the women as a pubic covering.

³ As quoted by Hartt, 1885, p. 22.

⁴ The "simple red pottery" to which he refers is probably the unslipped type we have called "plain."

⁵ See Estevão for a map showing distribution of sites.

⁶ For more detail and illustrations see Palmatary; Nordenskiöld, Pls. 24-36; and Estevão.

⁷ See, for example, Cruls, Pl. 12.

⁸ Pp. 469-470 and Pl. 16; compare with Netto, Pl. 1, Figs. 2-3 from Marajó.

⁹ Nordenskiöld, Pl. 54.

¹⁰ Métraux, Fig. 35, p. 166.

¹¹ Netto, Pl. 5 A, Fig. 3.

¹² Torres, Pl. 32; compare with Pl. 31 showing pottery from Marajó.

¹³ See Nordenskiöld and Goeldi for illustrations.

¹⁴ See Nordenskiöld, pp. 28 ff. and Figs. 1, 3; Cruls, p. 197; also compare Palmatary, Figs. 34-35 (Santarem) with Fig. 57 (Antilles).

¹⁵ Weiant, p. 46

¹⁶ Serrano, 1941, Figs. 3, 5.

¹⁷ Nordenskiöld, pp. 6-19.

¹⁸ See Estevão, map; Palmatary, pp. 4-5.

¹⁹ P. 66, footnote.

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FIG. 1. Plain. Height 13 cm.



FIG. 2. Red champlevé. Height 13.2 cm.



Incised designs

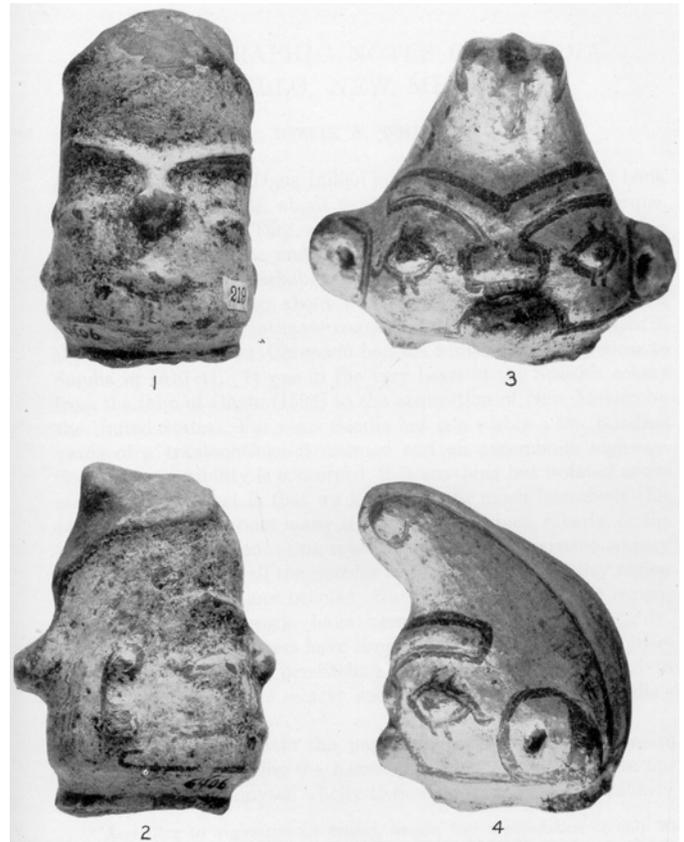
FIG. 1. White champlevé. FIG. 2. Double-slipped champlevé.
FIG. 3. Red simple-incised. FIGS. 4-5. Plain incised.



Adornos

Figs. 1-3. Plain solid rim adornos

FIG. 4. White-slipped hollow appliqué



Figs. 1-4. Figurine heads. Height about 10 cm. Figure 2 faces right.

PENNSYLVANIAN PLANTS FROM THE GLACIAL DRIFT NEAR JACKSON, MICHIGAN

CHESTER A. ARNOLD AND GEORGE M. STANLEY

INVERTEBRATE fossils are common objects in the pebbles and boulders of the Pleistocene glacial drift, but well-preserved plant remains are rare. Notable exceptions, however, are the cuticles and spores found by Bartlett (1928) in coal fragments from the drift at Ann Arbor. The remains of *Stigmaria* have also been reported in hard sandstone boulders near Ann Arbor and Jackson (Arnold, 1934). In neither of these instances has the source of the plants been traced, and the assumption is that they came from some near-by Carboniferous formations. The largest collection of plants from the drift known to the present authors is in the possession of Mr. R. E. Hodges of Jackson. The specimens, of which there are several dozen, consist of compressions of stem fragments, foliage, and seeds, which were found in the waste rock of an abandoned gravel pit in the southeastern corner of the farm of the Southern Michigan State Prison about two miles north of Jackson. A brief examination of the collection revealed the following species, although the list is an incomplete one.

<i>Sphenopteris</i> sp.	<i>Neuropteris</i> sp. (cf. <i>N. obliqua</i>)
<i>Corynepteris coralloides</i> ?	<i>Neuropteris tenuifolia</i>
<i>Eremopteris</i> sp. (aff. <i>E. artemisiae-folioides</i>)	<i>Megalopteris Kellyi</i>
<i>Neuropteris gigantea</i> ?	<i>Cordaites principalis</i>
	<i>Cardiocarpon reniformis</i>

Although some of the determinations given above are tentative, the collection is of more than casual interest because both the plants and the red ironstone nodules in which they are preserved are characteristic of the formation designated by Kelly (1933) as Cycle "A" of the Saginaw group (upper Pottsville). The only known outcrops of this formation are in three quarries near Grand Ledge, which is thirty-eight miles north-northwest of Jackson.

Cyclical formation "A" as exposed at Grand Ledge is about ten feet thick, and consists of sandstone, sandy shale, underclay, and a red ironstone nodule layer. The formation is capped by a black plastic marine shale bed containing *Lingula carbonaria*. One of the plants characteristic of this nodule layer is *Megalopteris Kellyi* (Arnold, 1934), which in Michigan seems to be restricted to this horizon. This plant has large ribbonlike bifurcated leaves with a thick midrib, and lateral veins which pass at right angles to the margin.

Because it has not been possible to follow the individual formations of the Saginaw group for any great distance in Michigan the cyclical units as recognized by Kelly at Grand Ledge have not been correlated with beds in other localities, although some of the plants which are present in abundance in Cycle "A" are found at other places within the state. The occurrence of the plant-bearing ironstone nodules in the drift near Jackson

indicates, therefore, that they were transported to that place from some point near or within ten miles east of Grand Ledge, and when the facts concerning the direction of the latest ice movements are taken into consideration, this seems reasonably certain.

The position of the moraines and eskers near Jackson (Fig. 1, based on Leverett, 4) indicates that the direction of ice movement during the last glacial stage was about 20 degrees east of south. The southern half of the Rives Junction esker extends in a direction south 20 degrees east, and terminates about two miles north of the city and west of the plant locality. Two smaller eskers in Bunker Hill and Henrietta townships parallel it to the east, and both extend at right angles to the trend of the Kalamazoo moraine at Jackson. The large esker extending from Lansing to Mason has a similar course. A line drawn from Grand Ledge to the plant locality is about 27 degrees east of south, so that it appears probable that the plants came from some unknown outcrop of cyclical formation "A" in the direction of Lansing. On the other hand, it is possible that there are undetected irregularities in the direction of the ice movement, or that at some earlier glacial stage the plants were moved eastward from Grand Ledge and brought to their present location along the line indicated by the trends of the eskers and moraines. But since there are no facts to support these alternatives other than that the known outcrops of the rock are confined to the vicinity of Grand Ledge, it is futile to speculate further upon them.

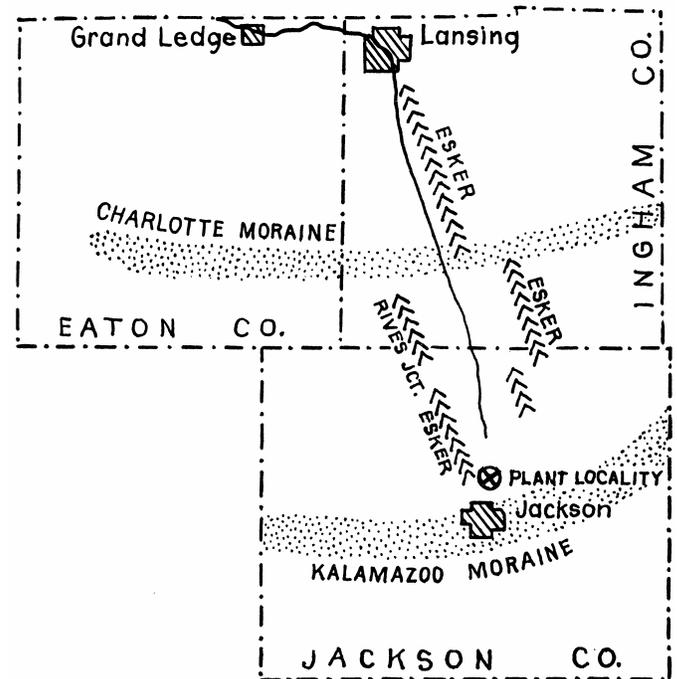


FIG. 1. Sketch map of Eaton, Ingham, and Jackson counties showing the plant locality north of Jackson and its relation to the trend of the eskers and moraines

The shape and size of the plant-bearing nodules rule out any likelihood that they were brought to their present location by stream movements. Some that are a foot or

more in diameter and weigh several pounds are flat, and could not have rolled for any distance without being pulverized. Moreover, the large streams of melt water arising at the ice front flowed generally to the west and southwest, and could not have carried the nodules from Grand Ledge to this present location on the state prison farm.

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