The Log House in Mexico: Distribution, Origin, and Dispersal.

John Joseph Winberry
Louisiana State University and Agricultural & Mechanical College

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The Louisiana State University and Agricultural and Mechanical College, Ph.D., 1971
Geography

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ORIGIN, AND DISPERSAL

A Dissertation

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Louisiana State University and
Agricultural and Mechanical College
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in

The Department of Geography and Anthropology

by

John Joseph Winberry
B.A., Louisiana State University
in New Orleans, June, 1967
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<table>
<thead>
<tr>
<th>TABLE OF CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
</tr>
<tr>
<td>LIST OF PLATES</td>
</tr>
<tr>
<td>ABSTRACT</td>
</tr>
<tr>
<td>INTRODUCTION</td>
</tr>
<tr>
<td>Purpose</td>
</tr>
<tr>
<td>Procedure</td>
</tr>
<tr>
<td>Origin of the Log House in Mexico</td>
</tr>
<tr>
<td>Possibility of Independent Invention</td>
</tr>
<tr>
<td>Thesis</td>
</tr>
<tr>
<td>CHAPTER I. THE LOG HOUSE IN MEXICO: PRESENT DISTRIBUTION</td>
</tr>
<tr>
<td>Terminology for the Log House</td>
</tr>
<tr>
<td>Corner-timbering</td>
</tr>
<tr>
<td>Forms and Distributions</td>
</tr>
<tr>
<td>Terminology</td>
</tr>
<tr>
<td>Construction of the Log House</td>
</tr>
<tr>
<td>Preparation of the Logs</td>
</tr>
<tr>
<td>Building the House</td>
</tr>
<tr>
<td>Roofing Materials</td>
</tr>
<tr>
<td>Life Expectancy and Mobility of the House</td>
</tr>
<tr>
<td>CHAPTER II. THE LOG HOUSE IN MEXICO: REGIONAL TYPES.</td>
</tr>
<tr>
<td>Tarascan Sierra of Michoacán</td>
</tr>
<tr>
<td>House Types</td>
</tr>
<tr>
<td>Hipped-roof house</td>
</tr>
<tr>
<td>Basic form</td>
</tr>
<tr>
<td>Modifications</td>
</tr>
<tr>
<td>Gabled-roof house</td>
</tr>
<tr>
<td>Auxiliary Structures and the House-yard</td>
</tr>
<tr>
<td>Topic</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ensamblada Construction</td>
</tr>
<tr>
<td>Mixteca Alta and Sierra de Mije of Oaxaca</td>
</tr>
<tr>
<td>House Types</td>
</tr>
<tr>
<td>Mixteca Alta</td>
</tr>
<tr>
<td>Hipped-roof house</td>
</tr>
<tr>
<td>Gabled-roof house</td>
</tr>
<tr>
<td>Sierra de Mije</td>
</tr>
<tr>
<td>Hipped-roof house</td>
</tr>
<tr>
<td>Gabled-roof house</td>
</tr>
<tr>
<td>Llano Grande and Cuajimoloya</td>
</tr>
<tr>
<td>Auxiliary Structures</td>
</tr>
<tr>
<td>Sierra Madre Occidental of Northwest Mexico</td>
</tr>
<tr>
<td>House Types</td>
</tr>
<tr>
<td>Basic type</td>
</tr>
<tr>
<td>Modifications and other types</td>
</tr>
<tr>
<td>Characteristic features</td>
</tr>
<tr>
<td>Auxiliary Structures</td>
</tr>
<tr>
<td>East Mexico</td>
</tr>
<tr>
<td>Perote</td>
</tr>
<tr>
<td>House types</td>
</tr>
<tr>
<td>Hipped-roof house</td>
</tr>
<tr>
<td>Basic form</td>
</tr>
<tr>
<td>Modifications</td>
</tr>
<tr>
<td>Gabled-roof house</td>
</tr>
<tr>
<td>Auxiliary structures</td>
</tr>
<tr>
<td>Sierra de Puebla</td>
</tr>
<tr>
<td>House types</td>
</tr>
<tr>
<td>Basic form</td>
</tr>
<tr>
<td>Modifications and associated types</td>
</tr>
<tr>
<td>Hipped shake-roof house</td>
</tr>
<tr>
<td>Basic form</td>
</tr>
<tr>
<td>Modifications</td>
</tr>
<tr>
<td>Modified-hipped-roof house</td>
</tr>
<tr>
<td>Hipped thatch-roof house</td>
</tr>
<tr>
<td>Oreja-roof house</td>
</tr>
<tr>
<td>Gabled-roof house with door under gable</td>
</tr>
<tr>
<td>Auxiliary structures</td>
</tr>
<tr>
<td>Chamal and Naranjos Valleys</td>
</tr>
<tr>
<td>House types</td>
</tr>
<tr>
<td>Gabled-roof house</td>
</tr>
<tr>
<td>Apsidal-roof house</td>
</tr>
<tr>
<td>Other house types</td>
</tr>
<tr>
<td>Use of house space</td>
</tr>
<tr>
<td>Split-log houses</td>
</tr>
<tr>
<td>Northeast Mexico</td>
</tr>
<tr>
<td>House type</td>
</tr>
<tr>
<td>Uses of the house</td>
</tr>
<tr>
<td>Summary and Conclusions</td>
</tr>
</tbody>
</table>
# Chapter III. The Log House in Mexico: Origin and Dispersal

- Analysis of Present Distributions ........................................ 140
- Connections between Regions ............................................. 140
- Origins of Particular Elements ........................................... 142
- Accounts of Colonial House Types ....................................... 146
- Earliest Mention of the Log House in Mexico ............................. 150
- Initial Introduction of the Log House into Central Mexico ............. 152
- Critique of Established Hypotheses ...................................... 154
  - Introduction by colonists from Spain .................................. 154
  - Introduction by missionaries from central Europe ...................... 156
  - Introduction by Immigrants from Japan .................................. 157
- Author's Hypothesis ...................................................... 160
  - Introduction of the Log House into Perote ................................ 166
  - Introduction of the Log House into Oaxaca ................................ 167
  - Introduction of the Log House into the Sierra de Puebla ................. 170
  - Introduction of the Log House into Northwest Mexico .................... 174
  - Introduction of the Log House into Northeast Mexico ................. 177
- Summary ............................................................................. 179

# Chapter IV. Summary and Conclusion

- Present Distribution ...................................................... 188
- History of the Log House .................................................. 190
- Prospect for the Log House .................................................. 192

# Bibliography

- .................................................................................. 195

# Appendices

- .................................................................................. 217
  A. Folk House Roof Types .................................................. 218
    - Michoacan ................................................................ 218
    - Oaxaca ....................................................................... 219
    - Mixteca Alta .............................................................. 219
    - Sierra de Mije ............................................................ 219
    - East Mexico ................................................................ 220
    - Perote ......................................................................... 220
    - Sierra de Puebla ......................................................... 223
    - Naranjos Valley .......................................................... 225
  B. Gable Roof Construction .................................................. 227
  C. The Origin of Tejamanil .................................................. 232

# Vita

- .................................................................................. 237
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Checklist of Elements and Variants Applied to Log Houses</td>
<td>6</td>
</tr>
<tr>
<td>2. Frequency of Elements Observed on Houses in Michoacán</td>
<td>49</td>
</tr>
<tr>
<td>3. Dimensions of Log Houses in Michoacán: Hipped-Roof House</td>
<td>51</td>
</tr>
<tr>
<td>4. Frequency of Elements Observed on Houses in Mixteca Alta</td>
<td>63</td>
</tr>
<tr>
<td>5. Dimensions of Log Houses in Mixteca Alta: Hipped-Roof House</td>
<td>65</td>
</tr>
<tr>
<td>6. Dimensions of Log Houses in Mixteca Alta: Gabled-Roof House</td>
<td>66</td>
</tr>
<tr>
<td>7. Frequency of Elements Observed on Houses in Sierra de Mije</td>
<td>70</td>
</tr>
<tr>
<td>8. Dimensions of Log Houses in Sierra de Mije: Hipped-Roof House</td>
<td>71</td>
</tr>
<tr>
<td>9. Frequency of Elements Observed on Houses in Northwest Mexico</td>
<td>80</td>
</tr>
<tr>
<td>10. Frequency of Elements Observed on Houses in Perote</td>
<td>89</td>
</tr>
<tr>
<td>11. Dimensions of Log Houses in Perote: Hipped-Roof House</td>
<td>90</td>
</tr>
<tr>
<td>12. Frequency of Elements Observed on Houses in Sierra de Puebla</td>
<td>99</td>
</tr>
<tr>
<td>13. Dimensions of Log Houses in Sierra de Puebla: Gabled-Roof House</td>
<td>100</td>
</tr>
<tr>
<td>Table</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>15.</td>
<td>Dimensions of Log Houses in Sierra de Puebla: Hipped Thatch-Roof House (North of Jacala)</td>
</tr>
<tr>
<td>16.</td>
<td>Frequency of Elements Observed on Houses in Chamal and Naranjos Valleys</td>
</tr>
<tr>
<td>17.</td>
<td>Dimensions of Log Houses in Naranjos Valley: One-Room House</td>
</tr>
<tr>
<td>18.</td>
<td>Dimensions of Log Houses in Naranjos Valley: Paseo House</td>
</tr>
<tr>
<td>19.</td>
<td>Frequency of Elements Observed on Houses in Northeast Mexico</td>
</tr>
<tr>
<td>20.</td>
<td>Dimensions of Log Houses in Northeast Mexico</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1.</td>
<td>Index Map of Distributions of Corner-Timbered Log Construction in Mexico</td>
</tr>
<tr>
<td>2.</td>
<td>Distributions of Corner-Timbering and of Pine-Oak Forests in Mexico</td>
</tr>
<tr>
<td>3.</td>
<td>Distributions of Terms Meaning &quot;Log House&quot; in Mexico</td>
</tr>
<tr>
<td>4.</td>
<td>Distributions of Corner-Timbering Techniques in Mexico</td>
</tr>
<tr>
<td>5.</td>
<td>Distributions of Corner-Timbering Techniques in Sierra de Puebla</td>
</tr>
<tr>
<td>6.</td>
<td>Distributions of Terms Meaning &quot;Corner-Timber&quot; in Mexico</td>
</tr>
<tr>
<td>7.</td>
<td>Sketches of Roof Construction Using Shake and Tile</td>
</tr>
<tr>
<td>8.</td>
<td>Distributions of Log House Types in Michoacán</td>
</tr>
<tr>
<td>9.</td>
<td>Distributions of Log House Types in Oaxaca</td>
</tr>
<tr>
<td>10.</td>
<td>Distribution of Log Houses in Northwest Mexico</td>
</tr>
<tr>
<td>11.</td>
<td>Distributions of Log House Types in Perote</td>
</tr>
<tr>
<td>12.</td>
<td>Distributions of Log House Types in Sierra de Puebla</td>
</tr>
<tr>
<td>13.</td>
<td>Distributions of Log House Types in Chamal and Naranjos Valleys</td>
</tr>
<tr>
<td>14.</td>
<td>Distribution of Log Houses in Northeast Mexico</td>
</tr>
<tr>
<td>15.</td>
<td>Hypothesized Dispersal of Log Construction into Central Mexico</td>
</tr>
<tr>
<td>Figure</td>
<td>Hypothesized Dispersal of Log Construction in/\n</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>16.</td>
<td>Hypothesized Dispersal of Log Construction in Michoacán</td>
</tr>
<tr>
<td>17.</td>
<td>Hypothesized Dispersal of Log Construction in Perote</td>
</tr>
<tr>
<td>18.</td>
<td>Hypothesized Dispersal of Log Construction in Oaxaca</td>
</tr>
<tr>
<td>19.</td>
<td>Hypothesized Dispersal of Log Construction in Sierra de Puebla</td>
</tr>
<tr>
<td>20.</td>
<td>Hypothesized Dispersal of Log Construction in Chamal and Naranjos Valleys</td>
</tr>
<tr>
<td>21.</td>
<td>Hypothesized Dispersal of Log Construction in Northeast Mexico</td>
</tr>
</tbody>
</table>
# LIST OF PLATES

<table>
<thead>
<tr>
<th>Plate</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Corner-Timbering Forms</td>
<td>24</td>
</tr>
<tr>
<td>2. Corner-Timbering Forms and Gathering of the Logs</td>
<td>31</td>
</tr>
<tr>
<td>3. Preparation of the Logs and Construction of the Walls</td>
<td>34</td>
</tr>
<tr>
<td>4. Construction Tools and Roofing Materials</td>
<td>38</td>
</tr>
<tr>
<td>5. Mobility of the Log House</td>
<td>44</td>
</tr>
<tr>
<td>6. Log House Types of Michoacán</td>
<td>53</td>
</tr>
<tr>
<td>7. Log House Types of Michoacán</td>
<td>56</td>
</tr>
<tr>
<td>8. Auxiliary Structures and the House-yard; Ensamblada Construction in Michoacán</td>
<td>60</td>
</tr>
<tr>
<td>9. Log House Types of the Mixteca Alta</td>
<td>68</td>
</tr>
<tr>
<td>10. Log House Types of the Sierra de Mije and of Llano Grande and Cuajimoloya</td>
<td>74</td>
</tr>
<tr>
<td>11. Log Granaries of the Mixteca Alta</td>
<td>77</td>
</tr>
<tr>
<td>12. Log House Types of Northwest Mexico</td>
<td>82</td>
</tr>
<tr>
<td>13. Log House and Log Granary Types of Northwest Mexico</td>
<td>86</td>
</tr>
<tr>
<td>14. Log House Types of Perote</td>
<td>93</td>
</tr>
<tr>
<td>15. Log House Types of Perote</td>
<td>96</td>
</tr>
<tr>
<td>16. Log House Types of the Sierra de Puebla</td>
<td>102</td>
</tr>
<tr>
<td>17. Log House Types of the Sierra de Puebla</td>
<td>107</td>
</tr>
<tr>
<td>Plate</td>
<td>Page</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>18. Log House Types of the Sierra de Puebla</td>
<td>111</td>
</tr>
<tr>
<td>19. Log House and Log Granary Types of the Sierra de Puebla</td>
<td>117</td>
</tr>
<tr>
<td>20. Log House Types of the Chamal and Naranjos Valleys</td>
<td>121</td>
</tr>
<tr>
<td>21. Log and Split-log House Types of the Chamal and Naranjos Valleys</td>
<td>126</td>
</tr>
<tr>
<td>22. Log House Types of Northeast Mexico; The Popular House Types</td>
<td>136</td>
</tr>
<tr>
<td>23. Roof Construction</td>
<td>222</td>
</tr>
<tr>
<td>24. Roof Construction</td>
<td>230</td>
</tr>
</tbody>
</table>
ABSTRACT

Cultural geography has traditionally been concerned with understanding man's imprint on the earth's surface and the formation of the cultural landscape. The house provides a focus for such studies. House forms and construction techniques, both reflective of cultural orientations, persist through time and give mute evidence of the cultures that have contributed to the structure of the cultural landscape. This study seeks to delineate the present-day distributions of a particular dwelling type in Mexico, the corner-timbered log house, and to trace the history of its introduction and spread through the country.

Four major distributions of the corner-timbered log house occur in Mexico: the sierran regions of Chihuahua and Durango in Northwest Mexico, the Tarascan highlands in Michoacán, the Mixteca Alta and Sierra de Mije in Oaxaca, and four discontinuous zones in East Mexico. Three categories of log house types have been suggested: (1) The folk house, which involves the adaptation of corner-timbering, an introduced construction technique, to indigenous house patterns (floor plans and roof forms); (2) the introduced house, which arrived in Mexico with log construction; (3) the popular house--the log version of the adobe-walled,
gabled tile-roof town-house of central and southern Mexico—which is the prestige house, manifesting the builder's participation in mestizo, rather than Indian, culture.

Although the Indians of pre-Columbian Mexico made use of logs and planks, no documentary evidence supports a conclusion that they knew corner-timbering, and it is doubtful, on cultural-historical grounds, that the presence of corner-timbering in Mexico is due to independent invention. The earliest mentions of such log work occur in Joseph Och's description of Las Vagas in East Mexico from the mid-eighteenth century and in Francisco Clavijero's account of native granary types and the Calderón Report on Michoacán, both from the late eighteenth century. These accounts suggest a well-established log tradition in central Mexico in the mid-eighteenth century and imply its introduction by at least the early part of that century.

Because of the lack of documentation to test them, hypotheses explaining the introduction of corner-timbering into Mexico remain conjecture. This study hypothesizes an initial introduction of the technique by German miners settling at Sultepec in 1536. It seems probable that they built log houses; feasibly, Indian laborers adopted the tradition and carried it to Michoacán and to undetermined parts of central Mexico. Tarascan laborers perhaps introduced log construction forms and house types to the East
Mexico region of Perote in the early colonial period. Subsequent introduction to other areas of Mexico occurred in the nineteenth century. German miners apparently brought log construction to Oaxaca and the Sierra de Puebla in the third decade of the nineteenth century. American settlers introduced corner-timbering into Northwest Mexico in the mid-nineteenth century, and American colonists carried the tradition into the Chamal and Naranjos Valleys at the beginning of the twentieth century. An American hacendado was instrumental in the introduction of corner-timbering into Northeast Mexico in the late nineteenth century.

Despite its long history, the log house in Mexico is entering its decline. The rural-urban migration and its detrimental effect on all phases of folk culture, the declining prestige of the log house because of its associations with rural life, the forestry laws preventing free access to sources of timber, the increasing specialization of the rural economy and concommitant rise in the cost of constructing a log house, and the destruction of the forests are contributing to its ultimate disappearance from the Mexican cultural landscape.
INTRODUCTION

The rural house in Mexico has received little academic attention. Sociologists have concentrated on the "poor" condition of such housing and its presumed detrimental effects on the lives of the occupants;\(^1\) ethnographers, dealing with remnants of aboriginal groups in Mexico, have subsumed brief descriptions of the house under material culture.\(^2\) The geographic aspects of the folk house,\(^3\) the delineation of types and distributions, have remained largely untreated. Furthermore, the rural house of the mestizo, the landscape expression of which has much greater significance than that of the aboriginal house, has escaped consideration.

Purpose

This study will deal with one particular house type, the corner-timbered log house. Defined as a structure whose walls are made of horizontally laid round logs or logs hewn or sawed to rectangular shape interlocked at the corners by means of notching, it holds particular interest, because it is a house whose occurrence in Mexico seems out of place.

\(^1\)Notes will be found at the end of each chapter.
Normally not associated with a Latin American or Mediterranean cultural landscape but much more at home in the forested areas of non-Mediterranean Europe, its presence in Mexico has posed a puzzle to cultural geographers and historians.

This paper intends to contribute to the ultimate solution of the puzzle by shedding light on the geographical and historical aspects of this seemingly anomalous Mexican house type. Although the mode of construction, corner-timbering (the means of interlocking the logs at the corners by means of some form of notching), defines the object of this study, it does not exist independently of the other elements of the house. The geographic and historic aspects of corner-timbering or any component of the house may be studied independently, but this paper seeks to understand the present distribution and history of the log house in Mexico and, to that end, must consider many facets of the log house tradition; "... any attempt to understand the [log] cabin's history by considering only, as has been usual, its construction or only the shape of the floor plan would yield a faulty picture" (Glassie, 1968b: 361).

This study has four objectives: (1) Determine the types of corner-timbering and their distributions across Mexico (Chapter I). (2) Record as much descriptive data as possible regarding the log house tradition in Mexico (Chapter I). (3) Delineate the forms of the houses to which this
construction technique is applied and their distribution across Mexico (Chapter II). (4) Consider the possible routes by which log construction entered Mexico and diffused to the regions of its present distribution (Chapter III).

Procedure

Perusal of the literature and a preliminary field study allowed the establishment of four major areas of occurrence of corner-timbering in Mexico: Michoacán, Oaxaca, Northwest Mexico, and four discontinuous zones in East Mexico (These areas are outlined on the index map, Fig. 1). A field research period of six months provided the opportunity to categorize into types and map more intensively the distributions of the various log houses in each region. Besides these major concentrations, isolated occurrences of corner-timbered log work were encountered in parts of central Mexico around Huajumbaro and Angangueo in Michoacán and Amanalco in Mexico and have been reported in the highlands between Mexico City and Toluca, between Coalcomán and Aguililla in Michoacán (Personal communication from Robert West), and in the San Pedro Martir Mountains of Baja California (Personal communication from David Henderson). The general map (Fig. 1) denotes their locations, but, for lack of time, they received no detailed consideration. Corner-timbered granaries, apparently independent of
Fig. 1. Index map of distributions of corner-timbered log construction in Mexico (Boxed areas show orientations of regional maps).
the log house, occur in the highlands of central Guerrero 
(Personal communication from Robert West) and northeast of 
Colima, but, except where their presence is related to log 
houses, the maps do not include their locations.

An automobile traverse, supplemented by foot traves­ 
verses covering various areas not served by passable roads, 
was the primary field technique used. The main outlines of 
the concentrations were delineated by covering the main 
highways in each area, and traverses of secondary roads into 
the hypothesized distributional zones provided additional 
data to establish the dominant log house types. Although 
this method was the most feasible under the circumstances 
and the attempt was made to insure the continuity of log 
construction across the distributions, reliance on the lines 
of communication in selecting the sample did introduce a 
bias, which perhaps hypothesized a distribution of log con­ 
struction less extensive than the actual one and a typology 
of house types approximating, but not accurately reflecting, 
the true population. 4

To categorize the houses into types, twelve elements, 
each with two to four variants (Table 1), were chosen. About 
3700 corner-timbered houses provided the data, and the charac­
teristic traits of each house were recorded on a checklist, 
that included the elements and variants noted in Table 1, as 
the researcher moved along the traverse. Houses were located 
by odometer mileage and proximity to settlements noted on a
# TABLE 1

**CHECKLIST OF ELEMENTS AND VARIANTS APPLIED TO LOG HOUSES**

1. **Floor plan**  
   a. Square  
   b. Oblong rectangular  
   c. Apsidal  
   d. Other  

2. **Material (Walls)**  
   a. Plank  
   b. Hewn log  
   c. Unhewn log  

3. **Roof form**  
   a. Hipped  
   b. Gabled  
   c. Apsidal  
   d. Other  

4. **Gable (Gabled roof only)**  
   a. Horizontal  
   b. Vertical  
   c. Open  
   d. Other  

5. **Eaves**  
   a. Wide #  
   b. Narrow #  
   c. None  

6. **Material (Roof)**  
   a. Shake  
   b. Tile  
   c. Thatch  
   d. Other  

7. **Porch**  
   a. Attached or unattached  
   b. Deep or shallow°  
   c. Full length of wall or restricted to door  
   d. Front and/or back walls  

8. **Doors**  
   a. Front  
   b. Back  
   c. Side (Right)  
   d. Side (Left)  

9. **Window**  
   a. Front  
   b. Back  
   c. Side (Right)  
   d. Side (Left)  

10. **Door**  
    a. Short side wall**  
    b. Long side wall**  

11. **Chimney**  
    a. Present  
    b. Absent  

12. **Appendage**  
    a. Front  
    b. Back  
    c. Side (Right)  
    d. Side (Left)  

---

*This checklist was applied to all log houses observed in a region.

†Refers to arrangement of planks or logs to form gable.

#Wide and narrow were qualitatively determined on basis of appearance; there is no threshold value.

°Deep and shallow were qualitatively determined on basis of appearance; there is no threshold value.

**Short or gable side defined as side perpendicular to roof ridge; long side defined as side parallel to roof ridge.
1:200,000 base map. The variants were qualitatively determined, and quantitative analysis of their occurrences allowed the determination of the dominant house forms. The tables in Chapter II summarize the data from which the types were derived. Two figures describe each variant of the elements: (1) the actual number of observations of that variant, and (2) the frequency coefficient, the value arrived at by dividing the total number of observations for each element into the number of occurrences of the particular variant. The titles of the sections of each table denote the areas from which the data in that section were drawn; these areas, located on each regional map, have the same title as noted in the table. That is, the data included under "Gable Roof" in Table 2, Michoacán, means that the data were gathered from traverses in the area noted "Gable Roof" in Fig. 3, the regional map of Michoacán. The division of each region into sub-areas is based on the areal dominance of the various log house types, which in turn give the sub-areas their names.

Wherever possible, measurements augment the qualitative descriptive material; although the actual number of measurements does not constitute a large sample, the dimensions do supply some data for clarification of relationships between regions and may provide the basis for further work on the quantitative aspect of the house types. Interview of informants elicited information on terminology, mode of
construction, types of materials and tools used, and other elements involved in the log house tradition. Chapter I and Appendix A include most of this material.

**Origin of the Log House in Mexico**

**Possibility of Independent Invention**

The Indians of Mexico apparently had considerable familiarity with the working of wood;\(^5\) construction with logs, especially vertically situated, and planks or beams, usually for parts of the house other than the walls, has had a wide distribution in Mexico. Both Cortés (51) and Bernal Díaz del Castillo (159) mentioned the sale of planks and beams in the market-place of Tlatelolco, and Sahagún (III, 145) described the Aztec carpenter and his knowledge of working wood, noting that he dealt not only with firewood but also sold planks and logs:

\[
\text{El que trata en lena tiene montes y para cortarla usa de hacha, con que la corta, raja, cercena y parte, y la pone en rimero; vende también morillos, postes, pilares de madera, tablas, tajamaniles, y tablazones.}
\]

The Tarascans as well made considerable use of the timber resources from the vast forests covering the highlands of Michoacán in western Mexico; the *Relación de Michoacán* (16) noted that one official of the native government had charge over those cutting logs and making planks:

\[
\text{Había otro llamado Pucuriguari, disputado sobre todos que guardaban los montes, que tenían cargo de cortar vigas y hacer tablas y otra madera de los montes, y éste tenía sus principales por sí y los otros señores.}
\]
Motolinía (203), furthermore, noted the use of wood, probably vertically situated, in house construction near the Valley of Mexico: "... parte de las laderas y lo alto de los montes de las buenas montañas del mundo, porque hay cedros y muchas cipreses, y muy grandes; tanto que muchas iglesias y casas son de madera de ciprés."

Despite this apparently extensive use of wood, the natives had a limited, though apparently sufficient, inventory of tools for cutting and preparing the timber. The Spaniards introduced the first steel axe into Mexico; prior to this, the Indians used stone, copper, and possibly bronze axes for working wood. Chroniclers noted the extensive use of copper implements (Espinosa: 32; Valentini); but, as attested by Romesal in a 1606 account of the history of Chiapas and Guatemala, these were seemingly inefficient: "... they felled the trees with copper axes and often spent an entire day in cutting one single tree, though of inferior size; and if the tree was larger three and four days, those axes being very apt to break ..." (Valentini: 29). Bronze tools perhaps allowed a more efficient exploitation of timber resources, but whether the Mexicans knew bronze remains in question. Peter Martyr, writing in commentary on the tributes arriving from New Spain, did note the use of bronze tools: "... with their bronze axes and hatchets, cunningly tempered, they [the Indians] fell the trees" (Valentini: 24-25); and Bernal Díaz del Castillo (159) referred to bronze
implements in the market-place of Tlatelolco: "Vendian
hachas de latón y cobre y estaño." Although the introduc­
tion of the steel axe allowed a more extensive and intensive
use of the forest resources, the natives did have the
knowledge of woodworking; and the tools for cutting and
preparing the timber existed, despite their relative inef­
ficiency. Whether these crude tools allowed the extensive
and intensive exploitation of the forest resources required
for the log house remains an important question.

Early descriptions of the native house types do not
mention the extensive use of log construction at the time
of Conquest, nor do they suggest the presence of corner-
timbered log work. Orozco y Berra (1880:320) summarized
the available evidence regarding the pre-Columbian house
types in central Mexico and noted that the huts in the
rural areas had walls of branches and roofs of thatch, while
the houses in the towns had adobe or stone walls. Chroni­
clers also noted the house types from specific parts of
Mexico. Sahagún (III, 207) briefly mentioned the Tarascan
house: "Sus casas eran lindas aunque todas eran de paja."
Arregui (37-38) noted the house of Nueva Galicia: "Las casas
en que avitan son de paja y muy vajas y pequeñas. . . ." Mota
y Escobar (33) included a more detailed description of the
several house types in central and northern Mexico in his
geographical description of the provinces of Nueva Galicia,
Nueva Vizcaya, and Nuevo León: ". . . unas son de
gente muy pobre y agreste, que son fabricadas de sólo paja a
manera de tugurios; otras son fabricadas de palizada y
embarrados de barro; otras son las mejores, que son de
adobe cubiertas de vigas." Early accounts by Pérez de Rivas
provide descriptions of the houses of northwest Mexico; he
mentioned the houses of the Tepehuan (1645: 574): "Las
casas eran ó de madera [probably vertical log or vertical
stick] ó de piedra y barro . . ." and also noted the house
types of sierran groups to the north of the Tepehuan (1620:
5): "hazen las casas de piedra y barro. . . ."

Although the possibility that corner-timbered log
construction was known in Mexico prior to Conquest cannot
be summarily dismissed, the rudimentary tools known by the
Mexicans would indicate its economic unfeasibility and the
lack of its mention by early chroniclers would suggest that
it was not present at Conquest. However, this constitutes
solely negative evidence, which may contribute to but cannot
suffice for the conclusion that a particular element was not
present in the landscape.

Environmental determinism, contending that the log
house naturally occurs in forested areas, provides another
argument supporting the independent invention of corner-
timbering in Mexico. The environment does influence the
materials used in house construction; in order to build log
houses, timber resources must be available. But the way in
which the logs are arranged to form the walls is not
determined by the environment. The distribution of suitable forest resources in Mexico encompasses almost completely the areas of occurrence of the corner-timbered log house (Fig. 2), but the distributions are not co-terminous. The log house does not result from a direct response to the environment; its construction and form are functions of cultural orientation. The presence in Mexico of this relatively complex arrangement of logs involved in corner-timbering can only find explanation in its introduction in post-Conquest times.

In consideration of man's history, the role of independent invention in the distributions of similar cultural elements is negligible compared to the contribution of the mechanism of diffusion. That the aboriginal Mexicans independently invented corner-timbering is, on cultural-historical grounds, but a remote possibility.

Thesis

If the introduction of corner-timbering took place sometime after Conquest, from where did it come? Scholars have hypothesized a number of possible origins. This study contends that log construction in Mexico results from multiple introduction: German miners initially carried corner-timbering to central Mexico in the sixteenth century; other groups of German miners introduced log work to east and south Mexico in the early decades of the nineteenth century;
Fig. 2. Distributions of corner-timbering and pine-oak forests in Mexico (distribution of forest areas based on maps in Leopold and Tamayo).
and Americans brought the technique into the northern areas of Mexico during the nineteenth and early twentieth centuries. Stimulus diffusion accounts for the subsequent dispersal of corner-timbering in each region.
NOTES

1. For examples of the sociological point of view, see Cajiga and Reyes Paz.

2. Notable exceptions to this are two monographs on the Tarascans of Michoacán. Beals, McCorkle, and Carrasco presented a thorough study of the Tarascan plank troje, describing its form of construction and summarizing its history. West (1948) placed the troje in geographic perspective by tracing the distribution of the plank house in 1940, based on his field research, and in 1789, based on the Calderón Report. Both papers outlined the occurrence of the log house in other areas of Mexico as well.

3. Glassie (1968a: 1-17) has noted the difficulty in ascribing a simple definition to "folk." For the purposes of this paper, however, the folk house is defined as a dwelling whose mode of construction is known, if not practiced, by all members of a society and involves a pattern (especially floor plan and roof) and construction form that has been a part of the cultural inventory of that group for a considerable period.

   In Mexico, this simple definition is compounded by the fact that house form and construction technique emanate from two or more cultural orientations. To be "folk," an element must be "traditional" or be a part of the culture for a long time. Corner-timbering has apparently acquired folk status in Mexico; certain house forms, following indigenous patterns (floor plan and roof type), have been folk; but a new house, a "popular" or non-folk type, is beginning to encroach in many areas of log construction. This differentiation of house patterns will be treated more fully in Chapter II.

   Brunhes (1920) and Kniffen (1936, 1965) have shown that the study of the dwelling forms an integral part of cultural geography; repetition of this rationale seems unnecessary here.

4. The diffusion of new elements most frequently follows the main lines of communication, while the areas away from these preserve many old traits. New House forms and construction techniques have invaded the rural areas formerly dominated by the log house; reliance on observation from the roads may result in the passing over of relict areas, where log construction continues to prevail or at least exist.
5. Noquera (21) has emphasized the pre-Columbian use of wood in Mexico in his assessment of available evidence on building techniques:

Toda esta información es suficiente para señalar-nos el uso tan considerable que los indígenas hacían de la madera en las construcciones, bien sea como auxiliar de los edificios de cal y canto, ó bien como único material para la creación de sus moradas.

6. Entre los Nahoa las habitaciones ofrecían grandes diferencias. En los montes y campinas las chozas de la gente infeliz eran de ramas ó carrizos, con cubiertas de yerba ó paja. En los pueblos las paredes eran de adobes, ó de piedra y lodo. . . .

Other descriptions of central Mexican house types may be found in El Conquistador Anónimo (46-47), Salazar (34), Francisco Hernández (39), and Torquemada (247).

7. Efraín Hernández has suggested that the technique of corner-timbering was known in pre-Conquest times and used in the construction of maize granaries. He bases his argument on an account by Francisco Clavijero, describing a corner-timbered troje, and on representations in early codices of granaries with horizontal lines on the walls, suggesting a resemblance to the corner-timbered, flat-roofed granary, whose distribution includes parts of northwest Mexico and Oaxaca. Although the argument seems reasonable, scrutiny of his evidence reveals some weaknesses. Clavijero did not write until the late eighteenth century, over two hundred years after Conquest; he was perhaps describing a trait introduced after Conquest, but, because its apparently well-established distribution suggested such, he incorrectly interpreted it as having a pre-Columbian origin. The drawings from the codices resemble the present-day flat-roofed granaries, and the horizontal lines to suggest plank construction; but the absence of any representation of corner-timbering should be noted. The Indians of central Mexico do build granaries of horizontally-placed members that are not corner-timbered; the members are instead wedged between vertical posts set at the corners. The drawings could represent this form of construction.
CHAPTER I

THE LOG HOUSE IN MEXICO: PRESENT DISTRIBUTION

As indicated above, four major distributions of corner-timbered log or plank construction occur in Mexico (Fig. 1): the Sierra Madre Occidental in the states of Chihuahua and Durango in Northwest Mexico, the Tarascan Sierra in Michoacán, the Mixteca Alta and Sierra de Mije in Oaxaca, and four discontinuous zones in the Sierra Madre Oriental in East Mexico. This chapter will treat general aspects of the log house tradition in Mexico before turning to the delineation of the regional house types.

Terminology for the Log House

The term applied to the log house in each area shows considerable variation across Mexico (Fig. 3). In the Tarascan Sierra, the corner-timbered log or plank house is called troje. In Oaxaca, a considerable variety of terms occurs: casa de vigas, casa de morillos, and casa de troncos. The mestizos of Northwest Mexico refer to the log house as casa de traba or casa de trabada and casa de madera. A number of terms were recorded in East Mexico: casa de cajón in the area of Perote, casa de morillos and casa de
Fig. 3. Distributions of terms meaning "log house" in Mexico.
madera around Honey, Huauchinango, and Zacatlán, casa de engarzada in the area of Zacatlán, and casa de huacal around Huayacocotla and through the sierra to Jacala. In the sub-region focussing on the Naranjos Valley, casa de huacal and casa de trozos prevail. In the Chamal Valley, the log house is called casa de cuartón or cuartón de palma. Around Pablillo and Galeana, casa de madera, casa de morillos, and jacal are accepted names.

It is impossible to trace the actual origins of these words in regard to the log house, but what the names themselves mean may prove of interest. The American terms "log house" and "log cabin" focus on the materials used in wall construction. The same applies for casa de troncos, casa de morillos, and casa de trozos, which mean essentially log house, and casa de madera, which means wooden house. On the other hand, the mode of construction is the basis for casa de traba and casa de engarzada, which roughly translate corner-timbered house. Casa de cajón and casa de huacal refer to objects similar to the log house in appearance and perhaps similar in construction. The cajón, a chest or wooden booth, and the huacal, a wooden crate, are sometimes constructed by laying horizontal sticks or planks one over the other and joining them by some means other than notching. The term troje means granary and refers neither to form nor mode of construction; its application to the log house in Michoacán perhaps originates from the structure's
being used for storage.

**Corner-timbering**

**Forms and Distributions**

Only four corner-timbering techniques have been identified in Mexico (their distributions are shown in Fig. 4). Three of these are examples of true corner-timbering; the fourth is an example of false corner-timbering. True corner-timbering involves the alternate tiering of the logs: "The timbers in one wall lie half a thickness above or below those of the corresponding tiers in the adjoining walls" (Kniffen and Glassie: 49); furthermore, the logs are interlocked at the corners in such a way that necessitates no additional means of support. In false corner-timbering "the timbers of the corresponding tiers of the four walls lie even with one another" (Kniffen and Glassie: 49) and "are not locked in place" (Kniffen, 1969: 3); corner-posts or some other means of support must hold up the walls. The corner-timbering techniques in Mexico are very simple and show none of the variety and complexity that characterize the log tradition in Europe and the Eastern United States.

The single notch on the top side of the log (Plate 1a) occurs in Northwest Mexico, in the Sierra de Mije of Oaxaca, in East Mexico between Tlaxco and Chignahuapan and north of Zacatlán to Huauchinango and west to Huayacocotla, and in the Naranjos Valley (Figs. 4,5). The form of the side walls of the notch apparently depends at least partially
Fig. 4. Distributions of corner-timbering techniques in Mexico.
Fig. 5. Distributions of corner-timbering techniques in Sierra de Puebla.
Plate 1: Corner-Timbering Forms

a. Single notch on top of the log. Note the vertical walls of the notch that may result partially from the use of the saw in notching. (Cuajimoloya, Oaxaca; April, 1970)

b. Single notch on top of the log. Note the slanted walls of the notch that are usually associated with the use of the axe in notching. (West of Ayutla, Oaxaca; March, 1970).

c. Single notch on top of the log. Note the lower necking that improves the fit of the log into the notch and the resultant close log work. (East of Chignahuapan, Puebla; May, 1970)

d. Single notch on top of the log. Note the crude notching and the poor fit of the logs. (Matlehuacales, Puebla; May, 1970)

e. Double notch joint. Note the ring around the end of the log third from the top, to which are attached the chains or ropes used to haul the logs to the construction site. (Llano Verde, Oaxaca; March, 1970)

f. The double notch joint is almost exclusively used in plank construction. (Tejocote, Oaxaca; March, 1970)
PLATE 1
on the instrument used to make it. The saw (*sierra*) results in vertical walls (Plate 1a), whereas the use of the axe (*hacha*) and machete usually leaves slanted walls (Plate 1b). Close log work with lower necking to improve the fit of the timber into the notch (Plate 1c) is rare; a crude notching with considerable gap between the logs (Plate 1d) occurs more frequently.

The second technique, the double notch joint (*doble*) (Plate 1e), occurs in Michoacán, in the Mixteca Alta of Oaxaca, and in East Mexico around Perote, between Jacala and Huayacocotla, following a peripheral belt from Singuilucan southward to Paredón, and around Zacatlán (Figs. 4, 5). Again, the notches may have vertical or slanted walls, and the corner-timbering reveals a wide range of quality. Notched plank construction (Plate 1f) almost always makes use of this corner-timbering form.

The third true corner-timbering technique, a perfect example of the saddle notch, occurs in the Chamal Valley in East Mexico. This notch is situated on the bottom of the log (Plate 2a) and usually made with an axe or machete.

False corner-timbering, which occurs in two areas, Michoacán and Perote, involves the notching of the top of one log and the bottom of the log laid into it (Plate 2b), resulting in the even tiering of the adjacent timbers. Wooden pegs (*tarugos*), placed between each tier at the corner (Plate 2c), hold the walls up.
Although the three examples of true corner-timbering appear similar in form and method, each involves a different means of notching the timbers. For instance, the single notch on the top of the log involves a simple technique. The log is placed into the notch of the timber below it and then notched down to the top of that lower timber. The next timber is then set into the newly cut notch and should fit closely to the log below it. The double notch is somewhat more complicated; a notch on the bottom of the log precedes its being placed into the notch of the timber below it. The notch on the top of the log cannot simply cut down to the level of the lower timber but must compensate for the notch on the bottom of the next log to be laid. The single notch on the bottom of the log requires the complete cutting of the notch prior to the timber's placement in the wall.

Terminology

Associated with the technique of corner-timbering but not necessarily correlative with the individual types are the terms that refer to it (their distribution is shown in Fig. 6). In Northwest Mexico trabar means to corner-timber. In Michoacán, Perote, and the area between Honey and Jacala in East Mexico, encadenar describes this mode of construction. Around Zacatlán the term is engarzar. In the Naranjos Valley empalmar is most frequently reported, while in the Chamal Valley the term is trabar; within these last
Fig. 6. Distributions of terms meaning "corner-timber" in Mexico.
two areas encadenar and embonar also occur. In Oaxaca and Northeast Mexico, amordazar is used.

These terms, like those for the log house, show considerable variation across Mexico with some degree of homogeneity within each distribution. However, each term usually involves the adaptation of a word connoting something different. Trabar, to fit or to join one thing with another for greater strength or resistance, may come the closest to the idea. Encadenar, to link or join some thing with others, has the widest distribution in the country. Other names for corner-timbering encountered in the various regions include empalar, to join by the ends timbers or ropes, inserting or interweaving one into the others; engarzar, to link one thing with another or others, embonar, to fit or insert one thing into another, and amordazar, to place an instrument so as to impede speech or to gag. The adoption of most terms is self-explanatory; amordazar perhaps connotes the placing of one timber into the opening or notch of another. The terms for notch show somewhat more homogeneity through the country. Mordaza is the most commonly used term, though mosca and resaque occur with some frequency in East Mexico.

Construction of the Log House

Preparation of the Logs

The construction of the log house begins with the cutting and preparation of the logs. Informants report
various conifers, especially pino, ocote (or Nahuatl ocotl), and ovamel as the primary sources of timber in all regions except the Chamal and Naranjos Valleys of East Mexico, where palma real provides the exclusive source of logs. Trees are cut with axe or two-man saw (aserrote); and the logs are commonly allowed to season only a few days, a few weeks at the most, though the Tepehuan of Northwest Mexico allow the logs to season a few months (Pennington, 1969: 227). Teams of horses or oxen (Plate 2d) or a truck haul the logs to the house site. A hole cut in or a ring cut around the end of the log (Plates 1e and 2e) permits the attachment of the chains or ropes from it to the animals. Logs may be used for the walls without further preparation, or they may be hewn with an axe or adze (hachazuela) to form hewn beams (vigas) (Plate 3c), or they may be cut into planks (tablas) by being split with oak wedges and dressed with an adze (Beals, 1947: 17) or by using the two-man saw and the sawing platform (aserrador) (Plates 3a-b). The gathering of the wall materials usually consumes one or two weeks, but the actual time involved depends on the amount of preparation that the timbers must undergo. Informants have reported the allotment of three or four days to one month for the whole activity.

Building the House

Walls are built either directly on the ground or on
Plate 2: Corner-Timbering Forms and Gathering of the Logs

a. Saddle notch on the bottom of the log, used on palm logs in the Chamal Valley. (Chamel, Tamaulipas; May, 1969)

b. False corner-timbering. (South of Cruz Gorda, Michoacán; July, 1970)

c. False corner-timbering. Arrows point to the tarugos that support the even tiers of planks. (Las Vigas, Veracruz; April, 1970)

d. Logs are hauled to the construction site by teams of horses, mules, or oxen. (West of Chignahuapan, Puebla; May, 1970)

e. The holes in the ends of the logs allow the attachment of chains or ropes for hauling to the construction site. (South of Tlaxiaco, Oaxaca; March, 1970)
a foundation. In Michoacán and Perote, large stones raise the foundation beams of the house a foot to a foot-and-a-half above the ground; and in the Naranjos Valley, cement floors support the walls in some cases. In actual wall construction, two men may simply lift the logs by hand into position, or they may roll the timbers up an incline formed by two logs leaned from the ground to the height of the walls. The weight of the wall logs usually rests on the joints rather than on the timber below; and chinking, consisting of wood chips or small stones, and daubing, made of mud and straw or mud and moss, fill the gaps between the timbers (Plate 3d). In most regions the logs extend a uniform length of nine to twelve inches beyond the notch, but in the Naranjos and Chamal Valleys the log ends are cut off about five or six inches from the corner.

The relative thinness of some of the planks used in wall construction in East Mexico often results in warping and breaks or openings in the walls, the prevention of which requires a more elaborate construction involving the use of wooden pegs (tarugos). After a plank is set in place and locked at the corners, holes are drilled in its top at intervals of approximately three feet into which the pegs are set. Corresponding holes are made in the bottom of the next plank to be laid up, and the tarugos fit into these as the plank is set into place.
Plate 3: Preparation of the Logs and Construction of the Walls

a-b. Hewn logs may be sawn into planks with the two-man saw (aserrote) and the sawing platform (aserrador). (South of Pichucalco, Chiapas; April, 1970)

c. Logs are hewn to form vigas by use of an axe or adze. (Paracho, Michoacán; February, 1970)

d. Chinking and daubing fill the gaps between the logs. (North of Zacualtipán, Hidalgo; March, 1970)
The time required for building the house depends on the amount of daily activity devoted to its construction and the number of individuals involved. Two or three men can finish a house, including the roof, in usually one or two weeks. The carpintero, who notches and fits the logs, usually has charge of the construction; one or two helpers who raise the logs into place and assist in other heavy chores complement him. The carpintero receives about 25 or 30 pesos ($2.00 to 2.40) a day over the period of time specified by his contract with the home builder; his helpers may earn between 8 and 10 pesos ($0.64 to .80) a day.

The construction of the house involves the use of few and simple implements. The axe (hacha) has the longest tradition, being used for felling trees, hewing, and notching the logs. The adze (Plate 4a), called the angaru in Michoacán and the azuela (Pennington, 1969: 227) or hachazuela in other areas, serves for hewing. This implement has its blade perpendicular to the handle, and the individual hews by pulling the blade toward himself. The most popular instrument for notching is now the saw (sierra); the use of this tool has contributed to the straight-walled notch that predominates in most areas. The machete, a long-bladed knife, is also used for notching.

**Roofing Materials**

The roofing material most frequently associated with the log house is the wooden shake (tejamanil or tablita). 5

The maker of shakes chooses a straight-grained tree and saws the trunk into sections; he splits each section lengthwise through the middle into four quarters. Then, with a long machete-like blade (cuña de fierro) and usually a block of wood for a mallet, he splits each quarter into a number of thin, wedge-shaped shakes, each about one-half inch thick, 32 to 40 inches long, and about 7 inches wide. The shakes are usually laid green, although the Tarascans allow them to dry two or three hours (Beals, 1947: 17), and the Tepehuan leave the shakes to dry a considerable period and then soak them in a stream just before putting them in place (Pennington, 1969: 227). The two layers of shakes, situated on the roof in such a way that the thicker edge of each top shake offsets that of the lower (Fig. 7a), were formerly joined to the roof framework by wooden pegs (clavos de madera). Now, however, nails around which wires are frequently wrapped (Plate 4b), generally attach the shakes to the purlins. Another method of holding down shakes, frequently noted in Northwest Mexico, involves the placement of rocks over cross-pieces, which in turn rest on the shakes (Plate 4c). Formerly, the individual builder made the shakes for his own use, but now specialists do almost all the shake-making. The price of shakes varies; the quotes averaged between 10 and 20 centavos for each shake or for a load of 100 between 10 and 20 pesos ($ .80 to 1 .60 ). The roof of an average house requires approximately 1500 to 2500 shakes.
Plate 4: Construction Tools and Roofing Materials

a. Two basic wood-working tools used in log construction: the adze (angaru or hachazuela), on the left, and the axe (hacha), on the right. (El Tigre, Michoacán; February, 1970)

b. Shakes may be attached to the purlins by nails that in turn are wound around and connected one to another by wire. (Matlehuacales, Puebla; April, 1969)

c. Shakes may also be held down by rocks resting on cross-pieces, that in turn lie across the shakes. This is most frequently noted in Northwest Mexico. (Amanalco, Mexico; July, 1970)

d. Canalada tile. (Lagunilla, Hidalgo; August, 1970)

e. Plana tile. (Lagunilla, Hidalgo; August, 1970)
Thatch, the traditional roofing material for indigenous rural structures, is not widely used on log houses. Examples of thatching with highland grass (zacate) occur in most areas of log construction, but other types of thatching are dominant in specific regions. North of Jacala and in the Chamal and Naranjos Valleys, palm fronds of the palma real supply roofing material, sudadero de palma covers the log structures in Northeast Mexico, and in the Sierra de Mije, the long needles of the Pinus moctezuma form the roof. Except for Northeast Mexico, the methods of laying the thatch roof are briefly described in the respective regional sections of Appendix A.

Two types of tile (teja) are used for roofing: canalada (Plate 4d), a completely curved tile and the most frequently noted type, and plana (Plate 4e), a flat tile with a ridge along one side and an upturned lip along the other. The canalada tiles rest perpendicularly on the purlins, the first layer laid concave side up with each upper row partially overlaying the previously laid row and the second layer lying convex side up with each tile overlapping two tiles of the first layer (Fig. 7b). A row of tiles rests over the roof ridge. A single layer of plana tiles suffices to cover the roof. These also rest perpendicularly to the purlins, the upper rows partially overlapping the lower rows and the ridge of one tile overlapping the lip of the adjacent tile (Fig. 7c). Approximately 500 to 1000
Fig. 7. Sketches of roof construction using shake and tile.
tiles, costing about a peso apiece, are necessary for a roof.

Two roofing materials have recently begun to replace the traditional shake and thatch: lámina de cartón, corrugated, creosoted cardboard, and lámina de zinc, corrugated metal. A roof for the average house uses around 35 sheets of cartón, the price per sheet approximating 2 or 3 pesos. About 18 sheets of zinc, costing about 35 to 40 pesos per sheet, suffice for a house.

Although the actual prices of these substances vary from one region to another, and the amount needed depends on the house size, a comparison of the costs may provide some insight into the relative popularity of the roofing materials. The means of the prices reported by informants reveal that a roof of cartón costs approximately 90 pesos ($7.20), a shake roof about 325 pesos ($26.00), a roof of zinc around 675 pesos ($54.00), and a tile roof about 750 pesos ($60.00). Although the tile roof has the greatest prestige value and remains the most popular in most rural areas, the low cost of lámina de cartón has contributed to its growing acceptance as a roofing material.

Life Expectancy and Mobility of the House

The life expectancy of a log house varies between twenty and a hundred years, depending primarily on how well maintained the roof is. The latter is probably a valid figure because many old houses reportedly had an age of
seventy to eighty years. The roof does not have such a long life; shake roofs last up to twenty years, but replacement of the roof is suggested after about ten years. Tile and lámina de zinc have a life expectancy of decades, but lámina de cartón will last at the most five years and should be replaced after two or three years. The expected life of a well-laid thatch roof of palm fronds is twenty years, but a grass-thatch roof, even if well-laid, can expect no more than a five to ten year existence.

Log houses do not necessarily spend all their lives at one site; the Tarascans consider the troje moveable property, and many examples of houses moved from one site to another occur in East Mexico. Today, reassembly accounts for most log house "construction" (Plate 5a). The structure is taken apart, the logs and roof frame moved, and the house rebuilt on the new site; a new roof covering constitutes the only new part of the house. The job of moving the house requires only one or two workers and a carpintero. In order to insure the proper reconstruction of the house, a mark on each log, an actual number (Plate 5b) or a small notch (marca) (Plate 5c), made with a machete or an axe, shows its position in the wall. The whole process of moving and rebuilding the house usually takes a few days.
Plate 5: Mobility of the Log House

a. A log house that is being reassembled at a new site. (Cruz Blanca, Veracruz; April, 1970)

b. A log house that has been moved to a new site. Note the numbers on the front wall marking the position of each timber. (Guadalupe, Puebla; April, 1970)

c. Another means of marking the position of each timber is by notches (marcas), made by an axe or a machete. (North of Zacatlán, Puebla; August, 1970)
NOTES

1. The term *jacal* (from Nahua *xacalli*; *xamitl* meaning adobe or sand, and *calli* meaning house) originally referred to a mean dwelling having adobe walls and a thatch roof. In many parts of Mexico, the term applies to vertical log or vertical stick construction. Although not usually descriptive of corner-timbering, the meaning of *jacal* in Northeast Mexico has apparently been widened to include any house of unfinished wood construction, which includes the corner-timbered log house. The American term "shack" traces its origin to this Mexican word.

2. The explanation of vertical versus slanted walls may not be solely functional but may indicate two notching traditions. Erixon has noted that slanted (trapezoidal) notches were associated with the coniferous, round-log tradition of Scandinavia, while the vertically walled notch was associated with the hewn-log tradition from the hardwood areas of central Europe. Chapter III will consider the ramifications of this in regard to the introduction of log construction into Mexico.

3. Many species of conifers are apparently used in house construction; occurring in most regions are the following with their common names in parentheses: *Pinus ayacahuite* (pino cahuite, pino ahuite, oyacahuite), *P. teocote* (ocote, pino real), *P. leiophylla* (ocote blanco), *Abies religiosa* (oyamel), and *Pseudotsuga mucronata* (pinabete). Other sources of logs in specific regions are *P. moctezuma* (ocote macho, ocote blanco) in Oaxaca, *P. patula* (ocote, ocote macho, pino colorado) in East Mexico, *P. oocarpa* (ocote) in Michoacán and Oaxaca, and *P. lumholtzii* and *P. chihuahuana* in Northwest Mexico.

4. *Inodes texana*.

5. A brief review of the history of the wooden shake in colonial Mexico may be found in Appendix C.

6. Many conifers provide the major sources of shakes (see note 3 above), but among the more popular are *Abies religiosa* in Michoacán and Oaxaca, because it supposedly makes a more durable shake than does pine, and *Pseudotsuga mucronata* in Northwest Mexico.
CHAPTER II

THE LOG HOUSE IN MEXICO: REGIONAL TYPES

The log house is a manifestation in the landscape of man's use of the available resources as well as of the presence of corner-timbering. This chapter will describe the individual log dwelling types and their distributions in the four major regions of corner-timbered log work in Mexico. In order to simplify the typologies, the descriptions of the roof construction for the various houses have been appended, and the supplementary quantitative data have been placed into table form.

Three broad categories of log house types, based on floor plan and roof form, are suggested. The folk category, consisting of most log houses, includes the house forms (floor plan and roof type) that were apparently present in pre-Columbian times and that have assimilated log construction techniques; they are usually connoted as representative of aboriginal cultures. A second category, introduced types, consists of house forms whose arrival in Mexico apparently coincided with that of corner-timbered log construction. The popular category includes one type, the gabled tile-roof house; it denotes a house form that has apparently been
introduced since Conquest but has traditionally been of non-log construction. It is primarily associated with mestizo or Mexican national culture.

**Tarascan Sierra of Michoacán**

**House Types**

"The most striking material culture element of the modern Tarascans is the wooden house, constructed of logs or large planks placed horizontally and interlocked at the corners by notching or cogging in a fashion similar to the log house in Scandinavia" (West, 1948: 27). Two one-room house types dominate the log tradition in the Tarascan Sierra. The distribution of the folk house (Fig. 8), a hipped-roof structure centers on Paracho and extends westward through Angahuan toward Zirosto and eastward through Opopeo to Villa Madero. Another concentration of this house type, possibly related to the Tarascan Sierra, focusses on the Sierra del Tigre near Mazamitla, Jalisco, an area once peopled by speakers of Tarascan (Brand, 1944: 56). The other type, a gabled-roof house, occurs on the periphery of the folk house distribution toward the northeast around the lake region of Patzcuaro and toward the north around Zacapu and Zamora (Fig. 8).

**Hipped-roof house**

**Basic form**

The hipped-roof structure (Table 2; Plate 6a) has a
Fig. 8. Distributions of log house types in Michoacán.
## TABLE 2

**FREQUENCY OF ELEMENTS OBSERVED ON HOUSES IN MICHOACÁN**

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>VARIANTS</th>
<th>Hipped-Roof House</th>
<th>Gabled-Roof House</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NUMBER*</td>
<td>FREQUENCY COEFFICIENT</td>
<td>NUMBER*</td>
</tr>
<tr>
<td>Floor plan</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Oblong</td>
<td>47</td>
<td>.08</td>
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</tr>
<tr>
<td>Square</td>
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<td>.91</td>
<td>10</td>
</tr>
<tr>
<td>Material (Wall)</td>
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<td></td>
</tr>
<tr>
<td>Plank</td>
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<tr>
<td>Unhewn log</td>
<td>59</td>
<td>.10</td>
<td>4</td>
</tr>
<tr>
<td>Roof</td>
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<td></td>
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<tr>
<td>Hipped</td>
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<tr>
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<td>23</td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Adobe</td>
<td>--</td>
<td>--</td>
<td>13</td>
</tr>
<tr>
<td>Vertical</td>
<td>--</td>
<td>--</td>
<td>4</td>
</tr>
<tr>
<td>Eaves</td>
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<td></td>
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</tr>
<tr>
<td>Narrow</td>
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<td>.10</td>
<td>24</td>
</tr>
<tr>
<td>Material (Roof)</td>
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<td></td>
</tr>
<tr>
<td>Tile</td>
<td>--</td>
<td>--</td>
<td>22</td>
</tr>
<tr>
<td>Shake</td>
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<td>.86</td>
<td>7</td>
</tr>
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<td>Porch</td>
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</tr>
<tr>
<td>Deep attached</td>
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<td>.93</td>
<td>28</td>
</tr>
<tr>
<td>Door</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short side</td>
<td>173**</td>
<td>.30**</td>
<td>2</td>
</tr>
<tr>
<td>Long side</td>
<td>412</td>
<td>.70</td>
<td>32</td>
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<tr>
<td>Appendage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side</td>
<td>48</td>
<td>.08</td>
<td>--</td>
</tr>
</tbody>
</table>

*Total sample was 585 log houses.

°Total sample was 34 log houses.

**In eastern part of distribution, ratio of short side to total was 112/118; a frequency ratio of .95.
square floor plan with dimensions approximating 13 feet by 13 feet (Table 3). Hewn planks (vigaa), about 3 inches thick and 9 to 12 inches wide, most frequently form the walls of the house. The hipped roof of shakes has wide eaves. A deep, attached porch, formed by extending the plank flooring of the main room beyond the front wall and sometimes walled in by extending the side walls, and a floored loft (tapanco) are also characteristic of this house type.

The situation of the door shows considerable variation; within the eastern range of the distribution around Opopeo and Villa Madero the door is most often located in the gable wall, the wall perpendicular to the roof ridge (Plate 6b), but around Paracho and westward therefrom, the door is most frequently noted in the long side, the side parallel to the ridge (Plate 6c). This variability in the location of the door apparently goes back to the pre-Conquest period, as shown in the drawings from the Relación de Michoacán.

Modifications

An unwalled, one-shed appendage, about 80 to 85 inches wide, modifies the basic house form. Referred to as the corredor, it is most frequently attached to a side of the house other than the front or back (Plate 6d).

Frederick Starr noted in the late nineteenth century another trait, a small window, still present on some Tarascan
TABLE 3
DIMENSIONS OF LOG HOUSES
MICHOACÁN

Hipped-Roof House

<table>
<thead>
<tr>
<th>Recorded Widths</th>
<th>Recorded Depths</th>
<th>Recorded Depth of Porch</th>
<th>Recorded Width of Eaves</th>
</tr>
</thead>
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<tr>
<td>8'8&quot;</td>
<td>7'11&quot;</td>
<td>32&quot;</td>
<td>--</td>
</tr>
<tr>
<td>9'2&quot;</td>
<td>8'9&quot;</td>
<td>40&quot;</td>
<td>20&quot;</td>
</tr>
<tr>
<td>9'6&quot;</td>
<td>9'2&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>9'9&quot;</td>
<td>8'9&quot;</td>
<td>40&quot;</td>
<td>20&quot;</td>
</tr>
<tr>
<td>11'8&quot;</td>
<td>10'10&quot;</td>
<td>37&quot;</td>
<td>25&quot;</td>
</tr>
<tr>
<td>12'0&quot;</td>
<td>11'0&quot;</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>12'2&quot;</td>
<td>11'8&quot;</td>
<td>47&quot;</td>
<td>25&quot;</td>
</tr>
<tr>
<td>12'7&quot;</td>
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<td>26&quot;</td>
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<tr>
<td>12'8&quot;</td>
<td>13'8&quot;</td>
<td>44&quot;</td>
<td>32&quot;</td>
</tr>
<tr>
<td>14'2&quot;</td>
<td>13'3&quot;</td>
<td>44&quot;</td>
<td>21&quot;</td>
</tr>
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<td>14'2&quot;</td>
<td>13'10&quot;</td>
<td>70&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>15'0&quot;</td>
<td>14'8&quot;</td>
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<td>25&quot;</td>
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<td>16'6&quot;</td>
<td>16'6&quot;</td>
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<td>24&quot;</td>
</tr>
<tr>
<td>17'1&quot;</td>
<td>12'11&quot;</td>
<td>42&quot;</td>
<td>--</td>
</tr>
<tr>
<td>18'5&quot;</td>
<td>16'11&quot;</td>
<td>28&quot;</td>
<td>20&quot;</td>
</tr>
<tr>
<td>20'0&quot;</td>
<td>18'10&quot;</td>
<td>59&quot;</td>
<td>36&quot;</td>
</tr>
</tbody>
</table>

Mean Width of House 13'4"
Mean Depth of House 12'5"
Ratio of Width to Depth 1.07
Mean Depth of Porch 40"
Mean Width of Eaves 24"
Plate 6: Log House Types of Michoacán

a. Hipped-roof *troje* in Michoacán. Note the extended side walls that sometimes close in the porch. (Rancho Seco, Michoacán; July, 1970)

b. Hipped-roof *troje*. The door is situated in the gable side. (Opopeo, Michoacán; July, 1970)

c. Hipped-roof *troje*. Door is in the long wall. (Cherán, Michoacán; July, 1970)

d. Hipped-roof *troje* with one-pent appendage (*corredor*) on the side. (Rancho Seco, Michoacán; July, 1970)

e. Hipped-roof *troje*. Note the shuttered window on the road side, a trait noted by Starr in 1900. (Capacuaro, Michoacán; February, 1970)
The log houses on the road side are all adapted to business; in the side toward the road is a small, rectangular opening which can be closed with a wooden shutter. When these are opened little stocks of spirits, fruits, cigarettes, etc. are displayed to the traveler.

From colonial times, the Tarascan was renowned for his woodworking ability, and the troje often bore evidence of this talent. Besides the craftsmanship involved in the construction of the house itself, elaborately carved ornamentation graced the columns (pilares), capitals (zapatas), and roof beams at the front of the porch (Plates 7a-b). Houses with such embellishments are referred to as trojes labradas, while the undecorated houses, which unfortunately almost exclusively dominate the area now, are called trojes lisas (Beals, et al.: 14).

**Gabled-roof house**

The gabled-roof house (Table 2; Plates 7c-d) has an oblong floor plan and walls of hewn plank. The gabled roof, almost exclusively constructed of tile, has narrow eaves and an adobe gable; the door and a deep, attached porch are situated on the long side. Plank flooring in the main room extending beyond the front wall to form the porch and a floored loft (tapanco) also characterize this house.

**Auxiliary Structures and the House-yard**

Besides the house types described above, two kinds of corner-timbered cocina, a separate kitchen, occur in the
Plate 7: Log House Types of Michoacán

a. Ornamental woodworking on the columns and capital of a troje labrada. (Museo Nacional de Antropología, Mexico; March, 1970)

b. Close-up of ornamental woodworking on the column of the same troje labrada. (Museo Nacional de Antropología, Mexico; March, 1970.

c. Gabled-roof troje in Michoacán. (Rancho Seco, Michoacán; July, 1970)

d. Gabled-roof troje. (Rancho Seco, Michoacán; July, 1970)

e. Troja Kosina. Note the smoke from the kitchen fire that pours out from all apertures; this is typical for all log houses throughout Mexico as there is usually no chimney or other special opening for the smoke to escape. (Capacuaro, Michoacán; July, 1970)
Tarascan area. One type, called the troja kosina (Beals, et al.: 15), has the same form as the hipped roof troje: square floor plan and a four-shed roof (Plate 7e). The porch, formed by the roof overhang, may be present, but a loft is never noted on this structure. The second type, with a limited distribution around Opopeo, has walls of either hewn or unhewn log and an oblong floor plan. The distinctive roof has three sheds (Plate 8a); one end has a gabled form or vertical gable, usually left open, and the other has a hipped form or slanted gable. The door is situated in the gable-end wall (Plate 8b), and a deep, attached porch may front the door. Normally, packed earth forms the floors of both cocinas.

An important element in the Tarascan cultural landscape is the house-yard, comprised of the troje, the cocina, and the portón (Plate 8c). The troje serves a number of purposes but primarily for storage. Located in the main room are the family altar with images of saints, the beds and chairs for guests, and the chests and boxes for storage of personal belongings. Small grains may be cached in this room, but the loft usually provides for storage of the grain harvest (Beals, et al.: 14; West, 1948: 28). A ladder through an opening in the loft floor from a corner of the main room or from the porch allows access to the tapanco. Two forms of the cocina have been described; a third type, the cocina de pie derecho (Beals, et al.: 15),
has walls of thin, vertically-set planks (palos), a gabled roof with the door opening beneath the gable, no loft, and a floor of packed earth. Used for cooking, the cocina also serves as the site of most family activity during the day and as the family's sleeping quarters at night. A high wall of stone or adobe, broken at only one point, usually surrounds the Tarascan house-yard. The portón, composed of tall double doors covered by a two-shed roof, provides the only entrance (Plate 8d). The troje, the cocina, and other auxiliary buildings face away from the street and onto a yard or cleared patch of ground.

**Ensamblada Construction**

Another mode of construction, also involving the horizontal arrangement of wall planks, found within the distribution of the corner-timbered troje is called ensamblada. This involves the morticing or fitting (embutir) of planks into vertical posts (jumbreras) situated at the wall corners. The basic appearance of this house (Plate 8e) is similar to that of the corner-timbered troje and suggests a possible evolutionary relationship. However, it seems that corner-timbering does antedate the morticed or ensamblada form of construction.
Plate 8: Auxiliary Structures and the House-yard, 
**ensamblada** Construction in Michoacán

a. **Cocina.** Note the distinctive three-shed roof.  
(Opopeo, Michoacán; July, 1970)

b. **Cocina.** The door is situated in the gable end of  
the three-shed roof. (Opopeo, Michoacán; July, 1970)

c. Model of Tarascan house-yard showing the **troje**, the  
**cocina** (in this case the **troja kosina**), and the  
**portón.** (Museo Nacional de Antropología, Mexico;  
March, 1970)

d. **Portón.** Note the ornamental carving on the panels  
of the double doors. This, like the **troje labrada**,  
is now very rare in the Tarascan highlands.  
(Angahuan, Michoacán; February, 1970)

e. **Troje of ensamblada construction.**  (Opopeo, Michoacán;  
February, 1970)
Mixteca Alta and Sierra de Mije of Oaxaca

House Types

Three separate zones of corner-timbered log construction occur in the mountains around the city of Oaxaca (Fig. 9). One distribution focuses on the Mixteca Alta to the west of the Valley of Oaxaca, and to the east and northeast of the Valley of Oaxaca lie two other concentrations, the former centering on Ayutla in the Sierra de Mije and the latter centering on the region adjoining Llano Grande, south of the former German mining center of Yavesía.

Although the hipped-roof houses of the Mixteca Alta and the Sierra de Mije may be related, their descriptions will be dealt with separately here.

Mixteca Alta

Two log house types (Table 4) occur in the Mixteca Alta. The traditional folk house has a hipped-roof, and its greatest concentration focuses on an area to the west of Tlaxiaco toward and including the land of the Triqui on the western flanks of the Mixtecan highlands between Copala and Juxtlahuaca, to the south around Chalcatongo, and to the east toward the Valley of Oaxaca. The second type, a gabled tile-roof house, has apparently displaced the folk house in the urban areas and along the highways; its distribution concentrates around the town of Tlaxiaco, northward along the highway to Tamazulapan, and along the
Fig. 9. Distributions of log house types in Oaxaca.
<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>VARIANTS</th>
<th>Number*</th>
<th>Frequency Coefficient</th>
<th>Number°</th>
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<td>Floor plan</td>
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<td>255</td>
<td>1.00</td>
<td>274</td>
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<td>Material (Wall)</td>
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<tr>
<td>Roof</td>
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<td>.73</td>
<td>66</td>
<td>.24</td>
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<td></td>
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<td>Eaves</td>
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<td>.41</td>
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<tr>
<td></td>
<td>Shal; attached</td>
<td>--</td>
<td></td>
<td>61</td>
<td>.22</td>
</tr>
<tr>
<td>Door</td>
<td>Long side</td>
<td>255</td>
<td>1.00</td>
<td>270</td>
<td>.98</td>
</tr>
</tbody>
</table>

*Total sample was 255 log houses.

°Total sample was 275 log houses.
Pan-American Highway southeast of Nochixtlán.

Hipped-roof house

The floor plan of the hipped-roof house (Table 4; Plates 9a-b) is oblong with dimensions approximating 13 feet by 10 feet (Table 5). Unhewn logs form the walls, and shakes most frequently cover the roof, which has wide eaves on all sides. The door is almost exclusively located in the long wall. The house does not have a loft nor a porch, nor do any appendages modify the basic form. The floor is most frequently of dirt.

Gabled-roof house

The second house type (Table 4, Plates 9c-d) also has an oblong floor plan, but the measurements approximate 21-1/2 feet by 14 feet (Table 6). Unhewn logs form the walls. The gabled tile-roof has wide eaves and a gable of vertical plank. The door opens onto a deep porch that runs along the side of the house parallel to the ridge.

In the area of Chalcatongo, two single-shed pents modify the basic house form (Plates 9e-f). Referred to as caídas de agua, these pents angle off the plate at each gable end of the house, extending out about two-and-a-half feet. No apparent function satisfactorily explains their presence as they are not wide enough to shelter a storage area. Perhaps the caída de agua preserves the visual effect of the low, wide eaves present on the hipped-roof house.
### TABLE 5

**DIMENSIONS OF LOG HOUSES**

**MIXTECA ALTA**

**Hipped-Roof House**

<table>
<thead>
<tr>
<th>Recorded Widths</th>
<th>Recorded Depths</th>
<th>Recorded Width of Eaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>12'1&quot;</td>
<td>9'6&quot;</td>
<td>--</td>
</tr>
<tr>
<td>12'1&quot;</td>
<td>10'6&quot;</td>
<td>21&quot;</td>
</tr>
<tr>
<td>12'2&quot;</td>
<td>10'4&quot;</td>
<td>22&quot;</td>
</tr>
<tr>
<td>12'4&quot;</td>
<td>10'5&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>12'10&quot;</td>
<td>10'0&quot;</td>
<td>22&quot;</td>
</tr>
<tr>
<td>13'0&quot;</td>
<td>9'9&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>13'9&quot;</td>
<td>12'3&quot;</td>
<td>--</td>
</tr>
<tr>
<td>15'5&quot;</td>
<td>10'1&quot;</td>
<td>26&quot;</td>
</tr>
<tr>
<td>16'3&quot;</td>
<td>12'8&quot;</td>
<td>--</td>
</tr>
</tbody>
</table>
### TABLE 6

**DIMENSIONS OF LOG HOUSES**

**MIXTEC ALTA**

Gabled-Roof House

<table>
<thead>
<tr>
<th>Recorded Widths</th>
<th>Recorded Depths</th>
<th>Recorded Depth of Porch</th>
<th>Recorded Width of Eaves</th>
<th>Mean Width of House</th>
<th>Mean Depth of House</th>
<th>Ratio of Width to Depth</th>
<th>Mean Depth of Porch</th>
<th>Mean Width of Eaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>16'10&quot;</td>
<td>13'1&quot;</td>
<td>45&quot;</td>
<td>28&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17' 2&quot;</td>
<td>12'1&quot;</td>
<td>42&quot;</td>
<td>27&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18' 0&quot;</td>
<td>12'0&quot;</td>
<td>51&quot;</td>
<td>28&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19' 4&quot;</td>
<td>15'9&quot;</td>
<td>54&quot;</td>
<td>24&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19' 7&quot;</td>
<td>12'8&quot;</td>
<td>40&quot;</td>
<td>24&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19'10&quot;</td>
<td>15'7&quot;</td>
<td>35&quot;</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21'10&quot;</td>
<td>11'2&quot;</td>
<td>56&quot;</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22' 2&quot;</td>
<td>16'7&quot;</td>
<td>62&quot;</td>
<td>32&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23' 4&quot;</td>
<td>13'0&quot;</td>
<td>54&quot;</td>
<td>24&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23'11&quot;</td>
<td>16'0&quot;</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24' 2&quot;</td>
<td>17'8&quot;</td>
<td>36&quot;</td>
<td>28&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25' 7&quot;</td>
<td>14'3&quot;</td>
<td>56&quot;</td>
<td>32&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27'10&quot;</td>
<td>16'10&quot;</td>
<td>65&quot;</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Plate 9: Log House Types of the Mixteca Alta

a. Hipped-roof house in the Mixteca Alta. (South of Tlaxiaco, Oaxaca; April, 1970)

b. Hipped-roof house. (Southeast of Tlaxiaco, Oaxaca; April, 1970)

c. Gabled, tile-roof house in Mixteca Alta. (Tlaxiaco, Oaxaca; April, 1970)

d. Gabled-roof house. Shakes are used instead of tile on some log houses of this type. (South of Tlaxiaco, Oaxaca; April, 1970)

e-f. Caída de agua on gabled-roof house. The caída angles off both gable sides at the plate. (North of Chalca-tongo, Oaxaca; April, 1970)
Sierra de Mije

Hipped-roof house

The limited distribution of the Mije folk log house (Table 7; Plates 10a-b) focusses on the area to the west of Ayutla. The oblong floor plan measures about 14 feet by 11-1/2 feet (Table 8). Unhewn log is used exclusively in wall construction. The hipped roof, thatched with pine needles, has a short ridge and narrow eaves. The culata, a log with diverging branches, lies over the ridgepole and holds down the thatching along the roof ridge; it forms a distinctive feature of the house (Plate 10a). The usually deep porch and the door are situated on the side parallel to the ridge; tamped earth forms the floor.

Gabled-roof house

In Ayutla and in the area immediately adjoining it, an oblong house with unhewn-log walls and a gabled tile-roof (Plate 10c) occurs. The roof has narrow eaves, and a gable of adobe brick supports the ridgepole. The deep porch and the door are on the side parallel to the ridge.

Llano Grande and Cuajimoloya

A distribution of two log house types centers on the highlands northeast of the Valley of Oaxaca. One house (Plate 10d), which occurs most frequently near Llano Grande, has an oblong floor plan and walls of unhewn log. Its gabled shake-roof has narrow eaves and a vertical plank
### TABLE 7

FREQUENCY OF ELEMENTS OBSERVED ON HOUSES IN SIERRA DE MIJE

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>VARIANTS</th>
<th>Hipped-Roof House</th>
<th>Gabled-Roof House</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NUMBER</td>
<td>FREQUENCY COEFFICIENT</td>
<td>NUMBER</td>
</tr>
<tr>
<td>Floor plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oblong</td>
<td>39</td>
<td>.81</td>
<td>11</td>
</tr>
<tr>
<td>Square</td>
<td>9</td>
<td>.19</td>
<td>--</td>
</tr>
<tr>
<td>Material (Wall)</td>
<td>Unhewn log</td>
<td>48</td>
<td>11</td>
</tr>
<tr>
<td>Roof</td>
<td>Hipped</td>
<td>42</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Gabled</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Gable</td>
<td>Adobe</td>
<td>--</td>
<td>8</td>
</tr>
<tr>
<td>Eaves</td>
<td>Narrow</td>
<td>40</td>
<td>11</td>
</tr>
<tr>
<td>Material (Roof)</td>
<td>Thatch</td>
<td>43</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Tile</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Porch</td>
<td>Deep attached</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Shal. Attached</td>
<td>20</td>
<td>--</td>
</tr>
<tr>
<td>Door</td>
<td>Long side</td>
<td>46</td>
<td>11</td>
</tr>
</tbody>
</table>

*Total sample was 48 log houses.

°Total sample was 11 log houses.
TABLE 8
DIMENSIONS OF LOG HOUSES
SIERRA DE MIJE

Hipped-Roof House

<table>
<thead>
<tr>
<th>Recorded Widths</th>
<th>Recorded Depths</th>
<th>Recorded Depth of Porch</th>
</tr>
</thead>
<tbody>
<tr>
<td>12'6&quot;</td>
<td>9'8&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>14'1&quot;</td>
<td>11'3&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>14'7&quot;</td>
<td>11'7&quot;</td>
<td>59&quot;</td>
</tr>
<tr>
<td>14'8&quot;</td>
<td>11'2&quot;</td>
<td>52&quot;</td>
</tr>
</tbody>
</table>
gable. The door and a deep, attached porch are situated in the long wall.

A second house type (Plate 10e), with an oblong floor plan and walls of unhewn log, is commonly found around Cuajimoloya. Wooden shakes form the hipped roof that predominantly has narrow eaves. Fronted by a deep porch formed by a break in the roof (Plate 10e), the door is located in the long wall.

Auxiliary Structures

Although a few, small, crudely-built, vertical-stick walled cocinas do occur in the Mixtec area, a number of corner-timbered cocinas (Plate 10f) were observed in the area around Llano Grande and Cuajimoloya, the separation of the kitchen does not appear to be standard practice in the Oaxacan highlands. The one-room, corner-timbered log house usually serves not only as the dormitory and the site for most family activity but also as the kitchen; the fire is built on the dirt floor to one side of the door. "The typical Mije house . . . never has a chimney. The smoke escapes through the roof, which, in time, acquires a dark black color" (Schmieder: 71).

Separate corner-timbered granaries, referred to as trojes, complement many log dwellings in the Mixteca Alta and Sierra de Mije and also occur with some frequency just beyond the northern periphery of log house distribution in
Plate 10: Log House Types of the Sierra de Mije and of Llano Grande and Cuajimoloya

a. Hipped-roof house in the Sierra de Mije. Arrow points to the culata over the roof ridge, a distinctive trait of the Mije log house. (West of Ayutla, Oaxaca; April, 1970)

b. Hipped-roof house. Note the deep porch that occurs on some folk log houses in the Sierra de Mije. (West of Ayutla, Oaxaca; April, 1970)

c. Gabled tile-roof house in Sierra de Mije. (Ayutla, Oaxaca; April, 1970)

d. Gabled-roof house in Llano Grande. (April, 1970)

e. Hipped-roof house near Cuajimoloya. Note the deep porch formed by a break in the roof pitch. (Colonia Benito Juarez, Oaxaca; April, 1970)

f. Corner-timbered cocina. (Cuajimoloya, Oaxaca; April, 1970)
the Mixteca Alta. They have usually a square floor plan, unhewn- or hewn-log walls, and a hipped roof of thatch (Plate 11a) or shake (Plate 11b), a flat roof of concrete (Plate 11c), or a gabled roof of thatch, shake, or tile (Plate 11d). The ventana or puerta, a small door just below the wall plate, provides access to the granaries. If high enough, it is reached inside and out by a log, notched with footholds, serving as a ladder (Plate 11e).

Sierra Madre Occidental of Northwest Mexico

House Types

"The most characteristic feature of Tepehuan economy is the house. This is a typical North American log cabin, rectangular, built of parallel superimposed pine logs notched and interlocked near the ends" (Mason, 1952: 43). This statement holds true not only for the native groups occupying the Sierra Madre Occidental but for the mestizo population drawn to the region by the rich resources of the sierra: minerals and timber. A concentration of corner-timbered log construction forms a northwest-southeast belt through the mountains (Fig. 10); the distribution begins near Yepáchic in the land of the Lower Pima and extends southeastward through the lands of the Tarahumar and Tepehuan in central and southern Chihuahua to the southern part of the state of Durango.
Plate 11: Log Granaries of the Mixteca Alta

a. Hipped thatch-roof troje in Mixteca Alta. (South­east of Teposcolula, Oaxaca; April, 1970)

b. Hipped shake-roof troje. (South of Teposcolula, Oaxaca; April, 1970)

c. Flat-roof troje. (Teposcolula, Oaxaca; April, 1970)

d. Gabled tile-roof troje. (North of Tlaxiaco, Oaxaca; April, 1970)

e. The ventana or puerta is the usual means of access to granaries; the notched log serves as a ladder to reach it. (South of Llano Verde, Oaxaca; March, 1970)
Fig. 10. Distribution of log houses in Northwest Mexico.
Basic type

A considerable variety of log house types appears in Northwest Mexico; the most important type (Table 9; Plates 12a-b), apparently the "building block" for many other houses in the area as well, occurs throughout the region. This house has an oblong floor plan, and unhewn logs form the walls. The gabled roof has narrow eaves and either an open or vertical-plank gable. Shakes compose the roofing material in most cases, but in central Chihuahua around Creel and along the railroad roofs of canoas, split logs whose centers have been scooped out lengthwise, and desecho, the refuse or outer barky part from the trees that have been sawed into lumber at the mills, occur with some frequency. Nails driven through to the purlins or rocks weighting down cross-pieces hold the roofing material in place. The house has the door in the long side and most frequently has no porch, although in central Durango shallow porches front the long side of a number of houses.

Modifications and other types

A concentration of two-room houses occurs in central Durango east of Valle de Topia. These have the appearance of two one-room houses (Plate 12c) set together gable to gable; a door leads into one of the rooms from the outside, and a door inside the house connects the two rooms. The gabled shake-roof has narrow eaves, and the gable is either open or of vertical planks.
### TABLE 9

**FREQUENCY OF ELEMENTS OBSERVED ON HOUSES IN NORTHWEST MEXICO**

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>VARIANTS</th>
<th>NUMBER*</th>
<th>FREQUENCY COEFFICIENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor plan</td>
<td>Oblong 1-room</td>
<td>372</td>
<td>.90</td>
</tr>
<tr>
<td></td>
<td>Oblong 4-room</td>
<td>14</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>Oblong 2-room</td>
<td>25</td>
<td>.06</td>
</tr>
<tr>
<td>Material (Wall)</td>
<td>Unhewn log</td>
<td>409</td>
<td>.99</td>
</tr>
<tr>
<td>Roof</td>
<td>Gabled</td>
<td>382</td>
<td>.93</td>
</tr>
<tr>
<td></td>
<td>Hipped</td>
<td>19</td>
<td>.05</td>
</tr>
<tr>
<td>Gable</td>
<td>Vertical</td>
<td>201</td>
<td>.53</td>
</tr>
<tr>
<td></td>
<td>Open</td>
<td>168</td>
<td>.44</td>
</tr>
<tr>
<td>Eaves</td>
<td>Narrow</td>
<td>395</td>
<td>.96</td>
</tr>
<tr>
<td>Material (Roof)</td>
<td>Shake</td>
<td>310</td>
<td>.75</td>
</tr>
<tr>
<td></td>
<td>Canoa</td>
<td>58</td>
<td>.14</td>
</tr>
<tr>
<td>Porch</td>
<td>No</td>
<td>213</td>
<td>.52</td>
</tr>
<tr>
<td></td>
<td>Deep attached</td>
<td>120</td>
<td>.29</td>
</tr>
<tr>
<td></td>
<td>Shal. attached</td>
<td>60</td>
<td>.15</td>
</tr>
<tr>
<td>Door</td>
<td>Long side</td>
<td>398</td>
<td>.96</td>
</tr>
</tbody>
</table>

*Total sample was 413 log houses.*
Plate 12: Log House Types of Northwest Mexico

a. Gabled-roof house in Northwest Mexico. This is the most frequently noted log house in the region and is the "building block" for the multi-room dwellings. Note the vertical planks that form the gable. (Valle de Topia, Durango; June, 1970)

b. Gabled-roof house. Note the vertical post (horcón) that supports the ridgepole and the open gable. (Creel, Chihuahua; July, 1970)

c. Two-room, gabled-roof house. (West of Tepehuanes, Durango; June, 1970)

d. Four-room, gabled-roof house. (Chamacuero, Durango; June, 1970)

e. Gabled-roof house. Note the deep porch formed by one shed of the gabled roof. (East of Valle de Topia, Durango; June, 1970)

f. Gabled-roof house. Note the cribbed logs that support the ridgepole and the deep porch. (West of Tepehuanes, Durango; June, 1970)
West of Tepehuanes in central Durango and among the Tepehuan of southern Chihuahua are large, multi-roomed structures. These houses have four rooms (Plate 12d); the floor plan has the appearance of two two-room houses that have been set long side to long side. The gabled shake-roof has narrow eaves, and vertical plank forms the gable.

Another house type (Plate 12e-f), widely distributed throughout much of central Durango and central and southern Chihuahua, has one or two rooms, a doorway in the long wall, and a deep, attached porch formed by one complete pent of the two-shed roof. The gables are either open or partially closed by vertical planks.

A distinctive house (Plate 13a), isolated examples of which occur throughout the region, has an oblong floor plan and walls of unhewn log. The ridgepole of the gabled roof lies perpendicular to the long walls; the door, located in the long wall, thus opens beneath the gable. Shakes form the low-pitched roof, and the gable is left open. Despite its infrequent occurrence in Northwest Mexico, this log house has considerable importance because of the similarity of its form to that of the transverse-pen house 2 of the western United States.

Characteristic features

Two features noted on some log houses are a distinctive means of supporting the ridgepole and the presence
of the loft. The horcón, a vertical post, at each gable end of the house usually provides support for the ridgepole (caballete) (Plate 12b), but a technique involving the cribbing of branches or small logs that are built up from the plates of the gable walls to support the ridgepole (Plate 13b) occurs among the Tepehuan and in central Durango. The loft (antitecho or tretecho), occurring on most log houses in the Northwest, is either left open or is closed by vertical planks. It apparently does not have importance as a storage place, only holding personal belongings such as clay pots, plows, bows and arrows, drums and so on (Pennington, 1969: 226). The terms applied to the loft suggest that its floor serves primarily as a ceiling or another roof for the house.

Auxiliary Structures

Separate granaries usually house the grain harvest; in central Durango, two types occur: one type (Plate 13c) has an oblong floor plan and a gabled shake-roof with open gables. The second type (Plate 13d) has a square floor plan and a one-shed shake-roof with a slight front to back pitch. Unhewn logs form the walls, and a small door near the plate provides access to both structure types. The Tarahumar of Chihuahua build a plank-walled, flat-roofed granary (reko'aka). It is traditionally their most solidly constructed building, usually far superior to the house:
Plate 13: Log House and Log Granary Types of Northwest Mexico

a. Gabled-roof house. Note the door opening under the gable and the low pitch of the roof. These traits are similar to the log house types of the American West. (West of Tepehuanes, Durango; June, 1970)

b. Gabled-roof house. Note the cribbed logs that support the ridgepole. (West of Tepehuanes, Durango; June, 1970)

c. Gabled-roof granary. (West of Tepehuanes, Durango; June, 1970)

d. One-shed-roof granary. (Valle de Topia, Durango; June, 1970)
"... carefully notched and fitted boards are placed on edge to form the side walls in log-cabin fashion. The notches are hewn out with ... much accuracy" (Bennett and Zingg: 55). Planks form the floor and ceiling, and usually a canoa roof, slanted front to back, covers the entire structure.

East Mexico
Perote

House types

Two log house types occur in the Perote area. The distribution (Fig. 11) of one form, a hipped-roof house, focusses on an area just north of Perote and extends westward to Guadalupe, northward to Altatongo, eastward to Las Vigas, and southward toward the Pico de Orizaba. The concentration of the second type, a gabled-roof house, occurs on the periphery of the folk house distribution, on the east extending beyond Las Vigas to Chiconquiac and skirting the eastern flank of the Cofre de Perote and on the west occurring from Altatongo through Teziutlán to Zaragosa.

Hipped-roof house

Basic form.—The hipped-roof house (Table 10; Plate 14a) has a square or oblong floor plan, its dimensions approximating 15 feet by 13 feet (Table 11). Hewn or sawed plants form the house walls; the hipped roof, predominantly of shakes, has wide eaves. A deep, attached porch occurs on
Fig. 11. Distributions of log house types in Perote.
<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>VARIANTS</th>
<th>NUMBER</th>
<th>FREQUENCY COEFFICIENT</th>
<th>NUMBER</th>
<th>FREQUENCY COEFFICIENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor plan</td>
<td>Oblong</td>
<td>300</td>
<td>.95</td>
<td>229</td>
<td>.97</td>
</tr>
<tr>
<td>Material (Wall)</td>
<td>Plank</td>
<td>223</td>
<td>.71</td>
<td>213</td>
<td>.90</td>
</tr>
<tr>
<td></td>
<td>Hewn log</td>
<td>55</td>
<td>.18</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Unhewn log</td>
<td>37</td>
<td>.12</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Roof</td>
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*Total sample was 315 log houses.  °Total sample was 237 log houses.

**Frequency ratio, Teziutlan to Zaragosa: .42
**TABLE 11**  
**DIMENSIONS OF LOG HOUSES**  
**PEROTE**

### Hipped-Roof House

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<td>20' 1&quot;</td>
<td>16' 7&quot;</td>
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the side with the door, which is located in the gable wall (Plate 14a) approximately 30 percent of the time and in the long side (Plate 14b) 70 percent of the time. The house usually has plank flooring and a floored loft.

**Modifications.**—Although the steeply-pitched, hipped shake-roof occurs most frequently on the folk dwellings, a hipped roof of tile, pitched at a smaller angle, does cover some log houses (Plate 14c). Some structures have a small window in the back wall that is covered with a wooden shutter (Plate 14d). The function of these openings remains unknown. A one-pent appendage, situated along one wall, modifies the basic house form (Plate 14e) in 5 to 6 percent of the cases.

**Gabled-roof house**

The second major house type (Table 10; Plate 15a) has an oblong floor plan and plank walls. The gabled roof, covered with tile, has narrow eaves and a vertical-plank gable. A deep, attached porch on the side parallel to the ridge protects the door. A one-pent appendage, situated on one of the gable sides, occurs on about 29 percent of the houses, with greater frequency around Teziutlán and Zaragosa where it occurs 41 percent of the time.

**Auxiliary structures**

The dwelling and the cocina make up the house-yard (Plate 15b). The house is used primarily for storage, the
Plate 14: Log House Types of Perote

a. Hipped-roof house in Perote. Note that the door is in the gable side. (Sierra de Água, Veracruz; April, 1970.

b. Hipped-roof house. The door is in the long side. Note the stones that support the foundation beams. (Orilla del Monte, Veracruz; April, 1970)

c. Hipped-roof house. Note the window in the back wall of the house that is reminiscent of the Tarascan troje. (West of Estanzuela, Veracruz; April, 1970)

d. Hipped-roof house. A few log houses have hipped tile-roofs, but their angle, usually about 25 degrees, is much smaller than that of the hipped shake-roof house. (West of Altatongo, Veracruz; April, 1970)

e. Hipped-roof house. Note the appendage on the side of the house. (Villa Aldama, Veracruz; May, 1970)
main room (sala) holding the beds and personal possessions and serving as the site for the family altar and various holy pictures (Plates 15c-d) and the loft (zarzo) being the storage place for grain. A separate structure, the cocina, is used for cooking, for most of the daily family activity, and apparently as sleeping quarters at night.

Two corner-timbered cocina types, with walls of log or plank, occur in the area; one follows the form of the hipped-roof house but lacks the plank floor or loft (Plate 15e), and the other has a gabled roof, narrow eaves, no porch, and the door almost always in the gable side (Plate 15b). The non-corner-timbered cocina de pie derecho has vertical plank walls, a gabled roof, no porch, and the door in the gable side.

No fence or wall presently surrounds the house-yard, but H. C. Ward did note in 1823 (195) "enclosures, twelve feet high" around the log houses in Las Vigas.

Sierra de Puebla

House types

Several log house types occur in the Sierra de Puebla region, a broad zone that includes various sub-systems of the Sierra Madre Oriental and extends from the barranca of the Rio Moctezuma around Jacala eastward through Molango and Honey to Huauchinango and then southward, following the highlands through Zacatlán, to just north of Tlaxco (Fig. 12).
Plate 15: Log House Types of Perote

a. Gabled tile-roof house in Perote. Note the appended structure on the side. (Plan de Guadalupe, Puebla; April, 1970)

b. Arrangement of the main house and cocina in the Perote area. Note the corner-timbered, gabled-roof cocina. (Magueyitos, Veracruz; April, 1970)

c. The main room (sala) of a hipped-roof house. Note the family altar with pictures of Our Lady and of the saints, the boxes for storage, and the bed. (Guadalupe, Puebla; April, 1970)

d. The main room (sala) of a hipped-roof house. Note the ladder that leads to the loft (zarzo), where the grain harvest is stored. (Guadalupe, Puebla: April, 1970)

e. Some corner-timbered cocinas have the same form as the main house. (Magueyitos, Veracruz; April, 1970)
Fig. 12. Distributions of log house types in Sierra de Puebla (the modified hipped roof and oreja roof log houses occur together in the southern most sub-area).
A gabled tile-roof house forms a central bloc between Honey, Huauchinango, Zacatlán, and Chignahuapan; an apparently degenerate form, a gabled shake-roof house, occurs south of Chignahuapan. A modified-hipped shake-roof house, which also occurs south of Chignahuapan, is present west of Honey through Tenango. Between Huayacocotla, Molango, and toward Encarnación hipped-roof structures prevail, being replaced by modified-hipped and gabled shake-roof houses near Encarnación. A thatched hipped-roof structure occurs in the vicinity of and to the north of Jacala; on the southern extreme of the distribution, the oreja-roof house shares dominance with the modified-hipped-roof house.

**Gabled-roof house**

**Basic form.**—The gabled tile-roof house (Table 12; Plate 16a) has an oblong floor plan, measuring about 14-1/2 feet by 11 feet (Table 13). Unhewn log most frequently forms the walls, but plank accounts for a large percentage of the corner-timbered dwellings (Plate 16b) around Zacatlán and to the east of Huauchinango. The roof has narrow eaves; around Honey and eastward to Huauchinango, vertical planks form the gable (Plate 16a), but south of Beristain and toward Zacatlán and Chignahuapan, horizontally laid plank or log prevails (Plate 16c). A deep, attached porch and the door are situated on the long side.
### TABLE 12

**FREQUENCY OF ELEMENTS OBSERVED ON HOUSES**

**SIERRA DE PUEBLA**

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<td>--</td>
<td>--</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Total sample was 474 log houses.  
2. Total sample was 157 log houses.  
3. Total sample was 146 log houses.  
4. Total sample was 40 log houses.  
5. Total sample was 72 log houses.  
6. Total sample was 161 log houses.

*In Tizapan and Tlahuelompa, the ratio of two doors occurring in the long side to the total was 19/30; a frequency coefficient of .63.
TABLE 13
DIMENSIONS OF LOG HOUSES
SIERRA DE PUEBLA

Gabled-Roof House

<table>
<thead>
<tr>
<th>RECORDED WIDTHS</th>
<th>RECORDED DEPTHS</th>
<th>RECORDED DEPTH OF PORCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>13' 0&quot;</td>
<td>10' 2&quot;</td>
<td>--</td>
</tr>
<tr>
<td>13' 9&quot;</td>
<td>11' 7&quot;</td>
<td>42&quot;</td>
</tr>
<tr>
<td>13' 10&quot;</td>
<td>10' 8&quot;</td>
<td>52&quot;</td>
</tr>
<tr>
<td>14' 7&quot;</td>
<td>11' 8&quot;</td>
<td>--</td>
</tr>
<tr>
<td>14' 8&quot;</td>
<td>9' 2&quot;</td>
<td>50&quot;</td>
</tr>
<tr>
<td>14' 9&quot;</td>
<td>12' 0&quot;</td>
<td>50&quot;</td>
</tr>
<tr>
<td>17' 3&quot;</td>
<td>11' 2&quot;</td>
<td>42&quot;</td>
</tr>
</tbody>
</table>

Mean Width of House 14' 6"
Mean Depth of House 10' 11"
Mean Depth of Porch 47"
Ratio of Width to Depth 1.33
Plate 16: Log House Types of the Sierra de Puebla

a. Gabled, tile-roof house in the Sierra de Puebla. Note the unhewn-log walls and the vertical planks forming the gable. (Huauchinango, Puebla; May, 1970)

b. Gabled tile-roof house. Note the plank walls that occur on a large percentage of corner-timbered houses around Zacatlán and Huauchinango. (Zacatlán, Puebla; May, 1970)

c. Gabled tile-roof house. Note the horizontal logs forming the gable. (North of Zacatlán; August, 1970)

d. Gabled tile-roof house. Note the one-pent appendage on the side of the house. (Huauchinango, Puebla; May, 1970)

e. Gabled tile-roof house with raised loft (tapanco). (North of Zacatlán, Puebla; May, 1970)

f. Gabled shake-roof house. Note the monacilla that supports the ridgepole, the horizontal logs that are morticed into the monacilla and form the gable, and the absence of a porch. (Matlehuacales, Puebla; May, 1970)
**Modifications and associated types.**—Two elements modify this basic house form. A single-pent appendage, flanking one of the gable sides (Plate 16d), occurs on about 10 to 15 percent of the houses. A raised loft (*tapanco*) (Plate 16e), present on approximately 20 percent of the corner-timbered houses north of Zacatlán, results from the placement of the ceiling joists (*vigas*) below the wall plates. The loft forms a slight overhang in both the front and back.

South of Chignahuapan, another gabled-roof house (Plate 16f), possibly a degenerated form of the tile-roof type, occurs. It has an oblong floor plan, walls of unhewn log, and a gabled roof of shake, rather than of tile, with narrow eaves. The house usually has no porch, although a deep, attached porch does occur on some of the log dwellings. A distinctive trait of these houses and some of the structures north of Zacatlán is the gable formed by horizontally situated logs (*tisteras*). One end of each log is morticed into the *monacilla* (a notched, vertical post set on the middle of the gable-wall plate that supports the ridgepole) and the other end is bracketed and held in place by a pair of rafters (*tijeras*).

**Hipped shake-roof house**

**Basic form.**—The hipped shake-roof house (Table 12; Plates 17a-b), whose distribution extends from west of
Molango to Huayacocotla, has an oblong floor plan with dimensions approximating 13 feet by 10 feet (Table 14). The shake-roof has narrow eaves; the door and a deep, attached porch are present on the long side. A window in one of the gable walls occurs on about 12 percent of the houses.

Modifications.—An interesting variation of this house type occurs just south of Zacualtipán where about 65 percent of the log houses have two doors in the long wall (Plate 17c).

North of Molango and around Huayacocotla, a mud covering (embarro) (Plate 17d-e), packed over the log walls and sometimes white-washed with lime (cal) (Plate 17f), reportedly gives further protection against cold winds and improves the appearance of the house. The trait apparently has a long history; a 1607 relation from the Huasteca noted: "... las casas son de palizada y barro" (Descripción de Guauchinango: 122), and a 1791 account reported: "Las casas ... fabricadas de rajas de otate, y luego embarradas, con lodo, y blanqueadas con cal ..." (Relación de Tianguis-tenango: 185-86).

Modified-hipped-roof house

Between Huayacocotla and Tenango a gradual transition from a hipped-roof house to a modified-hipped-roof house (Table 12; Plate 18a; Fig. 12) takes place. When viewed from the long side, this latter roof form has the appearance of a
# TABLE 14

**DIMENSIONS OF LOG HOUSES**

**SIERRA DE PUEBLA**

Hipped Shake-Roof House

<table>
<thead>
<tr>
<th>Recorded Width</th>
<th>Recorded Depth</th>
<th>Recorded Depth of Porch</th>
<th>Mean Depth of House</th>
<th>Mean Width of House</th>
</tr>
</thead>
<tbody>
<tr>
<td>12' 2&quot;</td>
<td>8'11&quot;</td>
<td>45&quot;</td>
<td>13' 5&quot;</td>
<td></td>
</tr>
<tr>
<td>13' 0&quot;</td>
<td>10' 4&quot;</td>
<td>42&quot;</td>
<td>10' 2&quot;</td>
<td></td>
</tr>
<tr>
<td>15' 2&quot;</td>
<td>11' 2&quot;</td>
<td>38&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ratio of Width to Depth 1.32

Mean Depth of Porch 42"
Plate 17: Log House Types of the Sierra de Puebla

a. Hipped-roof house in Sierra de Puebla. (North of Zacualtipán, Hidalgo; March, 1970)

b. Hipped-roof house. (West of Huayacocotla, Veracruz; May, 1970)

c. Hipped-roof house. Note the double doors that have a restricted distribution south of Zacualtipán, Hidalgo. (Tizapan, Hidalgo; May, 1970)

d. Hipped-roof house. Note the mud covering (embarro) on the log walls. (Huayacocotla, Veracruz; May, 1970)

e. Close-up of embarro. Note the mixture of mud and grass that make it up. (Huayacocotla, Veracruz; May, 1970)

f. Close-up of embarro covered over with cal. (Tlanchinol, Hidalgo; May, 1970)
gabled roof, but it shows greater similarity to the hipped roof because the gable slants out and is usually of shake, the roof angle approximates that of the hipped roof, and the roof framework resembles that of the hipped roof. Eaves on the house are wide; east of Huayacocotla, the shake roof prevails, while tile becomes dominant around and to the east of Tenango. A deep, attached porch and the door are located on the long side. This house prevails south of Jacala (Plates 18c-d) and also occurs, with a frequency of .35 of all log houses, between Chignahuapan and Tlaxco at the southern end of the log house distribution; there, however, the shake-roof dominates, and the deep, attached porch is not always present (Plate 18b).

Hipped thatch-roof house

North of Jacala a hipped-roof house (Table 12; Plates 18e-f) that appears to follow the form of the Huastec vertical-stick house comes into dominance. The floor plan is oblong, measuring about 18 feet by 11 feet (Table 15), and unhewn log forms the walls. The hipped roof, thatched with palm, has wide or narrow eaves; a deep, attached porch and the door are almost exclusively located on the long side.

Oreja-roof house

The distribution of the oreja-roof house (Table 12; Plate 19a) lies south of Chignahuapan. Essentially a hipped-roof house, it has one distinctive modification: the
TABLE 15
DIMENSIONS OF LOG HOUSES
SIERRA DE PUEBLA

Hipped Thatch-Roof House
(North of Jacala)

<table>
<thead>
<tr>
<th>RECORDED WIDTHS</th>
<th>RECORDED DEPTHS</th>
<th>RECORDED DEPTH OF PORCH</th>
<th>MEAN WIDTH OF HOUSE</th>
<th>MEAN DEPTH OF HOUSE</th>
<th>MEAN DEPTH OF PORCH</th>
<th>RATIO OF WIDTH TO DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>16' 8&quot;</td>
<td>9' 9&quot;</td>
<td>57&quot;</td>
<td>17'11&quot;</td>
<td>10' 6&quot;</td>
<td>53&quot;</td>
<td>1.71</td>
</tr>
<tr>
<td>18' 3&quot;</td>
<td>11' 8&quot;</td>
<td>58&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18'10&quot;</td>
<td>10' 0&quot;</td>
<td>43&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Plate 18: Log House Types of the Sierra de Puebla

a. Modified-hipped-roof house in the Sierra de Puebla. Note the deep, attached porch. (North of Apulco, Hidalgo; May, 1970)

b. Modified-hipped-roof house. Note the absence of the porch. (South of Chignahuapan, Puebla; May, 1970)

c. Modified-hipped-roof house. (Near Encarnación, Hidalgo; May, 1970)

d. Modified-hipped-roof house. Note the deep, attached porch. (Near Encarnación, Hidalgo; May, 1970)

e. Hipped, thatch-roof house. The floor plan and roof form of this log house follow closely the pattern of the vertical-stick walled Huastec house. (North of El Pinalito; May, 1970)

f. Hipped, thatch-roof house. Note the deep, attached porch. (North of Jacala, Hidalgo; May, 1970)
ridgepole extends beyond the confluence of the sheds and is covered with a small gable of shakes at each end of the house, giving the appearance of a pair of ears (orejas). The other elements of the house resemble those of the modified-hipped-roof house: oblong floor plan, unhewn-log walls, narrow eaves, shake roofing material, and the door in the long wall. However, the oreja roof house always has a deep, attached porch associated with it.

Gabled-roof house with door under gable

A concentration of log houses, isolated from, but adjacent to, the main part of the Sierra de Puebla distribution (Fig. 12), occurs north of Singuilucan. These oblong houses (Plate 19b) have walls predominantly of unhewn log, gabled tile-roofs with narrow eaves and open or vertical-plank gables, no porches, the doors opening under the gables, and bare earth forming the floors. They show no relation to the other types in the Sierra de Puebla but do resemble the granary types described below that skirt, along the plateau, the periphery of the log house distribution.

Auxiliary structures

A number of outbuildings usually surround the house. Cocinas are frequent through the area, their construction following the same basic form as the houses. Some dwellings have lofts for storage, but separate granaries of many different forms—square, oblong, flat-roofed, hipped-roofed,
etc.—usually hold the grain harvest.

One particular granary type, occurring just beyond the western periphery of the log house distribution (Fig. 12), has two sub-types. One, referred to as troja (Plate 19c), has an oblong floor plan, plank or unhewn-log walls, and a gabled roof of cardboard, tile, shake, or tin with vertical-plank or open gables. The second sub-type, known by the Nahuatl term cincolote (Plate 19d-e), has a square floor plan and a gabled roof, usually of shake or thatch. An opening in the gable provides access to both granaries, but the height of the cincolote necessitates the use of ladders, traditionally made from logs that have been notched to provide footholds, to reach it (Plate 19e).

Chamal and Naranjos Valleys

A distribution of log houses, sub-divided into two assemblages on the basis of geographic discontinuity (Fig. 13) and variant notching techniques (Fig. 4), covers the Chamal and Naranjos Valleys. The larger sub-region centers on the Naranjos Valley between the towns of Tamasopo and Naranjos. Isolated groups of log dwellings occur along the highways from Tamasopo toward Valles and from Naranjos toward Nuevo Morelos, Antiguo Morelos, and Mante. The northern area focusses on the town of Chamal, now called Lopez Mateos; log construction concentrates in the upper Chamal Valley but is also present in the adjacent Valley of Ocampo.
Fig. 13. Distributions of log house types in Chamal and Naranjos Valleys.
### TABLE 16

**FREQUENCY OF ELEMENTS OBSERVED ON HOUSES IN CHAMAL AND NARANJOS VALLEYS**

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>VARIANTS</th>
<th>Gabled-Roof House</th>
<th>Apsidal-Roof House</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NUMBER*</td>
<td>FREQUENCY COEFFICIENT</td>
<td>NUMBER*</td>
</tr>
<tr>
<td>Floor plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oblong</td>
<td>117</td>
<td>.81</td>
<td>126</td>
</tr>
<tr>
<td>Paseo (2-room)</td>
<td>26</td>
<td>.18</td>
<td>53</td>
</tr>
<tr>
<td>Roof</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gabled</td>
<td>117</td>
<td>.81</td>
<td>48</td>
</tr>
<tr>
<td>Apsidal</td>
<td>--</td>
<td>--</td>
<td>112</td>
</tr>
<tr>
<td>Eaves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wide</td>
<td>71</td>
<td>.49</td>
<td>147</td>
</tr>
<tr>
<td>Narrow</td>
<td>70</td>
<td>.49</td>
<td>--</td>
</tr>
<tr>
<td>Material (Roof)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thatch</td>
<td>104</td>
<td>.73</td>
<td>158</td>
</tr>
<tr>
<td>Tin</td>
<td>29</td>
<td>.20</td>
<td>21</td>
</tr>
<tr>
<td>Porch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>48</td>
<td>.33</td>
<td>74</td>
</tr>
<tr>
<td>Deep attached</td>
<td>79</td>
<td>.55</td>
<td>92</td>
</tr>
<tr>
<td>Door</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long side</td>
<td>109</td>
<td>.76</td>
<td>118</td>
</tr>
<tr>
<td>Paseo</td>
<td>24</td>
<td>.17</td>
<td>52</td>
</tr>
<tr>
<td>Appendage+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side</td>
<td>19</td>
<td>.13</td>
<td>7</td>
</tr>
<tr>
<td>2-sides</td>
<td>--</td>
<td>--</td>
<td>18</td>
</tr>
</tbody>
</table>

*Total sample was 143 log houses.

°Total sample was 179 log houses.

†Includes culatas.
Plate 19: Log House and Log Granary Types of the Sierra de Puebla

a. Oreja-roof house in the Sierra de Puebla. (North of Tlaxco, Tlaxcala; August, 1970)

b. Gabled, tile-roof house with the door in the gable wall. (Langunilla, Hidalgo; August, 1970)

c. Troja. (North of Singuilucan, Hidalgo; August, 1970)

d. Cincolote. (Almaloya, Puebla; May, 1970)

e. Cincolote. Note the notched log serving as a ladder to provide access to the granary. (Museo Nacional de Antropología, Mexico; March, 1970)
House types

Gabled-roof house

A gabled-roof house with an oblong, one-room floor plan (Table 16; Plates 20a-b) prevails in Chamal and around Tamasopo and occurs in Naranjos. Like all houses in the region, the walls are of unhewn, palm logs. The roof has narrow or wide eaves with planks, split logs, or bamboo set vertically in Chamal and Naranjos and horizontally in Tamasopo forming the gable. Palm thatch usually covers the roof, but lámina de zinc, lámina de cartón, and paja, old stalks from the cane fields, provide major sources of roofing materials in Tamasopo. The deep porch, occurring on over half of the houses while about a third have no porch, and the door are usually situated on the long side.

Apsidal-roof house

A log house with an apsidal roof (Table 16; Plate 20c), meaning that its circumference forms an apsidal outline, occurs in the Valley of Naranjos and dominates the isolated groupings of houses outside the main distribution. The dimensions of the oblong, one-room plan approximate 16-1/2 feet by 13 feet (Table 17). The palm-thatch roof has wide eaves on all sides; the door is most frequently in the long wall.

An appendage, of vertical-stick or vertical-log construction and called the culata (Plate 20d), occurs on about 25 to 30 percent of the houses in the Naranjos Valley.
TABLE 17
DIMENSIONS OF LOG HOUSES
NARANJOS VALLEY
One-Room House

<table>
<thead>
<tr>
<th>RECORDED WIDTHS</th>
<th>RECORDED DEPTHS</th>
<th>Mean Width of House</th>
<th>Mean Depth of House</th>
</tr>
</thead>
<tbody>
<tr>
<td>15'10&quot;</td>
<td>10'10&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16'9&quot;</td>
<td>13'3&quot;</td>
<td>16'8&quot;</td>
<td>13'1&quot;</td>
</tr>
<tr>
<td>17'5&quot;</td>
<td>14'2&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ratio of Width to Depth 1.27
Plate 20: Log House Types of the Chamal and Naranjos Valleys

a. Gabled-roof house in Chamal Valley. Note the vertically set logs forming the gable. (Chamal, Tamaulipas; June, 1970)

b. Gabled-roof house in Naranjos Valley. Note the gable of horizontally placed bamboo. (Tamasopo, San Luis Potosí; June, 1970)

c. Apsidal-roof house in the Naranjos Valley. The apsidally-shaped roof is the traditional folk type in the area. (West of Ciudad Valles; June, 1970)

d. Apsidal-roof house. Note the culatas that flank the short sides of the house. Note the separate doors opening into them. (Naranjos Valley, San Luis Potosí State; June, 1970)

e. Apsidal-roof house. Note the culatas that extend beyond the front walls so as to provide openings off the porch. (North of El Estribo, San Luis Potosí; April, 1969)

f. Apsidal-roof house. Note the culata on one side and the unwalled extension of the roof, supported by horcones, on the other. (Flores Magón, Tamaulipas; June, 1970)
It has a semi-circular outline and is added to each or both of the short-side walls. The back wall of the culata is flush with the back wall of the house; the front may extend somewhat beyond the front wall to offer an opening off the porch (Plate 20e), or the culatas may have their own doorways and be constructed flush with the front wall as well (Plate 20d). In other cases the roof extends out about eight feet and is not walled in, being supported instead by one or two vertical posts (horcones) at the outer edge (Plate 20f). The addition of the culatas and the covering over of the house walls with clay (embarro) give the corner-timbered house a marked similarity in external appearance to the apsidally floor-planned, native jacal of vertical palm-log construction.

Other house types

A distinctive corner-timbered structure (Plate 21a), a few examples of which are present in Chamal, has deep porches on both long sides, one door in a long wall, and one door in a gable wall. From the gable side it resembles a single-crib barn of the eastern United States.

The two-room paseo house (Plate 21b), having a wide distribution through the Naranjos Valley and occurring with frequency in Naranjos and along the road from there to Antiguo Morelos, closely resembles the southern United dog-trot house. The two rooms, square or oblong in floor
plan and measuring about 14 feet by 13 feet (Table 18), are separated by a hallway (paseo), about 9 feet wide. In Naranjos the gabled roof of thatch or lámina with vertical-plank or vertical-log gables (Plate 21b) dominates, but outside the town the apsidal roof of palm thatch with wide eaves (Plate 21c) replaces it. The doors open from each room onto the paseo; window openings may occupy one or all three of the other room walls.

**Use of house space**

Usually the palm-log house is the only structure built by a family. Although a cement slab provides the foundation for the house walls in some instances (Plate 21d), the bare earth usually forms the floor; and the house normally has no loft. In one-room houses, all the family activity takes place in the dwelling, unless a crudely constructed cocina allows some spatial division of activity. In two-room houses that have the paseo, one room serves as the cocina, and the other provides quarters for sleeping and the storage of personal belongings; considerable family activity occurs in the open paseo. If a single room house has culatas, the main room is used for sleeping and storage, while one culata serves as the cocina and, if there are two, the second provides additional storage space.

**Split-log houses**

One other house type (Plate 21e), occurring west of
TABLE 18
DIMENSIONS OF LOG HOUSES
NARANJOS VALLEY

Paseo House

<table>
<thead>
<tr>
<th>Width of Room</th>
<th>Depth of Room</th>
<th>Mean Width of Room</th>
<th>Mean Depth of Room</th>
<th>Ratio of Width to Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>12' 6&quot;</td>
<td>12' 6&quot;</td>
<td>13' 8&quot;</td>
<td>13' 0&quot;</td>
<td>1.05</td>
</tr>
<tr>
<td>12' 6&quot;</td>
<td>12' 6&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13'10&quot;</td>
<td>13'11&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14' 0&quot;</td>
<td>14' 0&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14' 5&quot;</td>
<td>12' 7&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14' 6&quot;</td>
<td>12' 8&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Plate 21: Log and Split-log House Types of the Chamal and Naranjos Valleys

a. This palm-log structure, apparently used for storage, shows considerable similarity to the single-crib barn of the eastern United States. (Chamal, Tamaulipas; August, 1970)

b. Gabled-roof paseo house. This house has two rooms and a central hallway (paseo) and follows the pattern of the dog-trot house of the southern United States. Note the roof of lámina de zinc. (Naranjos, San Luis Potosí; February, 1970)

c. The apsidal roof has been adapted to the paseo house as well as the one-room house. (East of Naranjos, San Luis Potosí; June, 1970)

d. Three-room paseo house. Note the cement slab that the house is built on. (Agua Buena, San Luis Potosí; June, 1970)

e. Split-log construction. (East of Ciudad Valles, San Luis Potosí; June, 1970)

f. Close-up of split-log construction. Note the nails holding the split-logs to the vertical posts and the cement nogging between the logs. (East of Ciudad Valles, San Luis Potosí; June, 1970)
Ciudad Valles, should receive mention in this survey. Split logs, laid horizontally and nailed to vertical posts at each room corner (Plate 21f), form the walls. A similarity exists between this house and the few corner-timbered log houses occurring in the area, suggesting that the split-log house represents a degenerated form of the casa de trozos.

Northeast Mexico

House type

Two discontinuous concentrations (Fig. 14) of one log house type (Table 19; Plates 22 a-b) occur in Northeast Mexico, one focussing on the area to the east of Arteaga, extending southward through the sierra to just north of Galeana, and including a thin band of log construction along the eastern edge of the Mesa Central, and the other centering on the villages of Pablillo and Las Crucitas.

The house has an oblong floor plan, measuring about 10 feet by 14 feet (Table 20); these values approximate the dimensions estimated by one informant as three meters by four-and-a-half meters, about 10 feet by 15 feet. The house walls are most frequently of unhewn logs. The gabled roof has no eaves, and horizontally situated logs form the gable; sudadero de palma, the layer of dried brown leaves and bark just below the green crown of the single-branched palma samandoca (Plate 22c), forms the roof covering. The house has no porch, a dirt floor, and no loft. The horcón, a vertical post imbedded into the ground in the middle of each
Fig. 14. Distribution of log houses in Northeast Mexico.
TABLE 19

FREQUENCY OF ELEMENTS OBSERVED ON HOUSES
IN NORTHEAST MEXICO

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>VARIANTS</th>
<th>NUMBER*</th>
<th>FREQUENCY COEFFICIENT</th>
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<td>.99</td>
</tr>
<tr>
<td>Material (Wall)</td>
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<td>.79</td>
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<tr>
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<td>Hewn log</td>
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<td>.10</td>
</tr>
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<td>Plank</td>
<td>11</td>
<td>.11</td>
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<tr>
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<td>Gabled</td>
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<td>.95</td>
</tr>
<tr>
<td>Eaves</td>
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<td>1.00</td>
</tr>
<tr>
<td>Material (Roof)</td>
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<td>.74</td>
</tr>
<tr>
<td></td>
<td>Shake</td>
<td>15</td>
<td>.15</td>
</tr>
<tr>
<td>Porch</td>
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<td>1.00</td>
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<tr>
<td>Door</td>
<td>Short side</td>
<td>88</td>
<td>.89</td>
</tr>
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</table>

*Total sample was 99 log houses.
<table>
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<tr>
<th>RECORDED WIDTHS</th>
<th>RECORDED DEPTHS</th>
<th>Mean Width of House</th>
<th>Mean Depth of House</th>
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<td>10' 0&quot;</td>
<td>14' 2&quot;</td>
<td>10' 1&quot;</td>
<td>14' 4&quot;</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>10' 2&quot;</td>
<td>14' 2&quot;</td>
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<td></td>
</tr>
<tr>
<td>10' 3&quot;</td>
<td>14' 0&quot;</td>
<td>Ratio of Width to Depth</td>
<td>.70</td>
</tr>
</tbody>
</table>
gable wall, supports the ridgepole; the door is set in the gable wall but off-center, to the side of the horcón.

Uses of the house

The presence of a cocina or other structure associated with the log house varies from one area to another. The family usually uses only the log structure, and it serves for storage, for cooking, and as the site of family activity. The fire is built directly on the dirt floor and toward the rear of the house. As no chimney nor other escape hole exists for the smoke, it filters out through cracks in the roof, leaving the roof thatching blackened. In the plateau area, the log house has undergone a functional change; being superceded as the main house by a flat-roofed, adobe dwelling, it has become the cocina or even the granary or storehouse. In either capacity, the log structure serves out its remaining years with no change in form.

Summary and Conclusions

Three broad categories of log house types, based on floor plan and roof form, have been suggested and alluded to in this chapter: folk, introduced, and popular.

Folk houses account for a majority of the delineated types--these dwellings represent the adaptation of corner-timbering, an introduced construction technique, to established house types, following floor plans, roof forms, and dimensions present in Mexico from pre-Conquest times.
The folk category includes the (a) hipped-roof houses of Michoacán and Perote, although their classification is subject to question and will be dealt with in Chapter III, (b) the hipped-roof houses of the Mixteca Alta and Sierra de Mije in Oaxaca, (c) the oreja-roof and the two hipped-roof houses in the Sierra de Puebla, (d) the apsidal-roof, one-room house in the Naranjos Valley, and (e) the gabled-roof house of Northeast Mexico. In all instances these house forms follow the floor plans and roof types and approximate the dimensions of non-corner-timbered houses. Possibly included in this category is the modified-hipped-roof house of the Sierra de Puebla.

All these examples illustrate the persistence of form, that is floor plan, dimensions, and roof type, through change in material or construction technique. Each of the indigenous houses has assimilated corner-timbered log work in such a way as to retain the basic appearance of the native house, for each form follows the pattern of the cultural image of the house (Richardson: 1-2).

The builder begins with a notion in his head as to what the final product should look like. . . . The builder then attempts to mold his construction material into a form that fits his mental image. . . . The resulting product . . . testifies to the ways in which the society mobilizes its resources in order to imprint itself on the natural landscape.

The culture dictates the forms of all material traits, and, unless socio-cultural factors void it, which has happened in the case of the popular house, this retention of form continues.
Not only the form but frequently any contribution to the basic appearance of the house also persists. For instance, embarro, originally applied to palisada construction in the Sierra Huasteca, now occurs on horizontal-log walls. In the Naranjos Valley, not only does the log house copy the apsidal floor plans, by adding the culatas, and the apsidal-roof forms, but the use of embarro continues in the tradition of vertical-log construction noted by Cabrera (121) in pre-log house days: "Enjarran estas paredes con barro batido con zacate. . . ." 

The introduced category includes a group of house types, whose introduction apparently accompanied that of corner-timbered log construction, occurring in parts of northern Mexico: the paseo house and a single-crib barn in the Naranjos and Chamal Valleys and the gabled-roof house in Northwest Mexico. These areas perhaps felt most strongly the impact of foreign cultures, the foreign house types as a result displacing the native house forms.

One log house type (Plate 22d), the popular house, which has an oblong floor plan, gabled tile-roof, and deep, attached porch, merits special attention. Its importance lies in the homogeneity of its form through the discontinuous areas of its occurrence and its apparently recent intrusion into regions of log construction. In the Mixteca Alta informants reported the introduction of this house within the last twenty years, a conclusion supported by the absence of
any mention of it by Sherburne Cook in a 1939 paper on the house types of the area. In the Sierra de Puebla its arrival postdates a description of 1900 which refers to the houses along the road between Tulancingo and Huauchinango as "log structures with shingled four pitched roofs . . ." (Starr, 1908: 242). The origin of this house apparently traces to the adobe-walled, gabled tile-roof house that has the same basic form (Plate 22e). Introduced from Andalucia during the sixteenth century (West and Augelli: 273), it has a distribution through central and southern Mexico, frequently occurring in the central Mexican townscape. Because of its urban associations, this house form has become the prestige house, representing Mexican national or mestizo culture. The log version of this gabled tile-roof house has gradually displaced the traditional folk log dwellings in urban areas and along highways, reflecting the dynamic situation of social and cultural flux, hastened by the incursion of roads and other elements of national culture, being experienced in rural Mexico as the inhabitants become more mestizised or seek to manifest mestizo culture. The folk house form as well as other material traits and the native language reveal to the world that the builder and user is Indian; the desire to eschew Indian associations necessitates the gradual pruning of these traits. It is doubtful that the process will reverse.
Plate 22: Log House Types of Northeast Mexico; The Popular House Type

a. Gabled, thatch-roof house. Note the door in the gable side and the vertically set horcón, which are characteristic of this house type. (Puerto Grande, Coahuila; April, 1969)

b. Well-constructed, gabled-roof house. Note the shake roof and hewn-log walls; both are rare in Northeast Mexico. (Las Playas, Nuevo León; April, 1969)

c. Palma samandoca (Samuela carnerosana). Arrow points out the material, sudadero de palma, traditionally used in roof construction. (Cieneguillas, Nuevo León; August, 1970)

d. The popular house type, a gabled tile-roof log house. (East of Coacoyunga, Puebla; May, 1970)

e. Gabled tile-roof, adobe-walled house. Note the similarity to the basic form of the log house in Plate 22d. The adobe house usually has columns at the front edge of the porch as does the corner-timbered structure. (East of Tulancingo, Hidalgo; May, 1970)
NOTES

1. "The usual Pima house is of pole and shingle construction . . . with a second room in front of poles cribbed or laid horizontally between two pairs of upright posts. . . . Near one house was a granary built of cribbed beams and without a roof (Mason and Brugge: 288)."

2. An example of this house is shown in Gritzner (183).

3. The oreja has been noted on thatched-roof houses, especially on those of the Popoloca, which has given it the name "oreja Popoloca" (Hoppe, Medina, and Weitlaner: 493), the Chocho (Hoppe and Weitlaner: 510), and other groups in southern Puebla and northern Oaxaca. Although the text makes no mention of it, photographs from Harvey and Kelly (656) suggest that this feature may also occur on the houses of the Lowland Totonac. The presence of this trait in northern Puebla presently eludes explanation, its distribution among the groups mentioned above being well-removed from the Sierra de Puebla region of log houses.

4. For a description of the single-crib barn, see Kniffen (1965: 564-65); of the dog-trot house, see Glassie (1968a: 88-98).

5. This layer of leaves from the Samuela carnerosana is stripped from the trunk, allowed to dry, and then tied to the roof frame.

6. In Michoacán the Tarascan troje seems to preserve the form shown in the drawings from the Relación de Michoacán; the hipped-roof house of the Mixteca Alta patterns the house types noted in the Mixtec lowlands; examples in the Sierra de Puebla of the Otomi house form, the roof of which is characterized by "a short peak and a steep slope on all four sides (Dow: 9)," persist in horizontal log; in the Naranjos Valley the apsidal house of jacal construction provides the pattern for the corner-timbered log house; and in Northeast Mexico, the form of the casa de madera follows that of the vertical-stick choza, the "desert house" (West and Augelli: 372), that also has the horcon, the thatched roof, and the door situated in the gable side. In the Sierra Madre Oriental north of Jacala the hipped thatch-roof log house replicates the form and dimensions of the Huastec vertical-stick dwelling, the
measurements of the corner-timbered log structure varying around a width of 17'7" and a depth of 10'4" and those of an example of the stick house having a width of 17'11" and a depth of 10'6".

7. Kniffen (1960: 22) has observed that "the form of a structure persists even when the materials change." Hall (84) has noted the relation between form and construction material, drawing the distinction between the formal, house design, and the technical, house construction material and technique, and has come to the same conclusion as Kniffen.
CHAPTER III

THE LOG HOUSE IN MEXICO: ORIGIN AND DISPERSAL

The history of the log house in Mexico has posed a mystery to culture historians. If it results from post-Conquest introduction, when did it arrive in Mexico, whence did it come, and who carried it to the New World?

The distribution of the log house in Europe forms a broad band arcing from the sub-arctic forests of Sweden and Finland through Poland and Czechoslovakia to the highlands of southern Germany and southwestern France. Eastward it extends through Russia to Manchuria and the islands of Japan.¹

The spread of log construction in the United States dates to the early eighteenth century, when German colonists, who introduced corner-timbered log work to Pennsylvania, and Scotch-Irish settlers, who quickly adopted it, carried it southward through the Appalachians and westward to the Mississippi.² The log house entered Texas by at least the 1820's³ and moved on into west Texas and New Mexico by the 1840's.⁴

This study hypothesizes an initial introduction of corner-timbered log work into central Mexico by German
miners who settled at Sultepec in the early sixteenth century and subsequent introduction of the technique into Oaxaca and the Sierra de Puebla by other German miners in the nineteenth century. These hypotheses, however, are conjectural, supported solely by circumstantial evidence; much of the documentation or other hard facts necessary to test the hypotheses have yet to be unearthed.

Analysis of Present Distributions

The present distributions and typologies can provide some insight into the question of the origin of the log house in two regards: (1) Do the types suggest any relation between the regions delineated in Chapters I and II? (2) Can any elements of the log house be traced to European, American, or Japanese origins?

Connections between Regions

Comparisons of the regional log house types reveal little continuity between the regions, except in one case. As concluded in Chapter II, it seems that most log house types now present in Mexico result from the adaptation of an introduced construction technique, corner-timbering, to indigenous house patterns (floor plans and roof forms); as a result, the log house types merely reflect the established Mexican culture areas. The one exception suggests a strong relation between Michoacán and Perote. The basic floor
plan, the hipped roof of shake, the deep porch before the door, the plank flooring, the loft, and the elevation of the foundation beams on stones are common to the houses in both areas. Other similarities involve the separate cocina and its use for most family activity, the use of the house for storage, with corn and grains in the loft and personal effects in the main room, the enclosing of the house-yard by a high wall, noted at least in the last century for Las Vigas, and the presence of a small window in the back or side wall of the houses.

Although only four corner-timbering forms occur in Mexico, the variant notching techniques suggest little relation between the regions. The most wide-spread type, the double notch joint, formed by notching the top and the bottom of the log, occurs in Michoacán and Perote, where it is associated predominantly with hewn planks, and in the Mixteca Alta, Northeast Mexico, and parts of the Sierra de Puebla, where it occurs primarily on unhewn logs. That the gross similarity in form indicates a connection between the regions seems doubtful, with one exception, for two reasons:

(1) The techniques themselves are simple and non-distinctive, especially in contrast to the notching forms in Europe and the United States; subtle variations that may differentiate the forms from one area to another are not readily apparent.

(2) Each region is dominated by one notching technique; the replication of two or more notching forms from one area to
another would strengthen the argument supporting a connection. Again, Michoacán and Perote provide the exception—the double notch joint, used on hewn planks, and another notching form, false corner-timbering, occur together in both areas.

The vernacular terms for features of the log house reflect no apparent connection between the regions. The plethora of terms for "log house" and for "corner-timbering" suggest independently derived folk terms in each area.

In summary, the landscape evidence suggests little connection between the regions. Except in one area, analysis of the log house types and the notching forms indicates that corner-timbered log construction in Mexico results from multiple introduction, that it was adapted to indigenous house patterns (floor plans and roof forms), and that it received local names in each area. The one exception exists between Michoacán and Perote, where the similarities in house types and notching techniques indicate a connection between the two regions.

Origins of Particular Elements

The analysis of log house elements with the aim of tracing their origins to Europe, America, or Japan involves conjecture and raises more questions than answers.

Although most log houses involve the adaptation of corner-timbering to indigenous dwelling forms, a few structural types have a non-indigenous origin. In the Chamal and
Naranjos Valleys, the two-room paseo house (resembling the American two-room dog-trot) and a storage structure (resembling the American single-crib barn) can be traced to building forms in the Upland South culture region of the United States. The one-room, gabled thatch-roof house of the Chamal and Naranjos Valleys and the one-room, gabled shake-roof house of Northwest Mexico resemble the single-pen house of the Upland South. Although the Mexican varieties lack the porch, the wide eaves, and the stone piers common on the houses in the southern United States, they may represent the continuation of the gradual simplification of the single-pen house as it moved westward: "... several of the southern characteristics of the cabin disappeared to the west and somewhat hybrid forms appeared" (Wright: 48). One distinctive house type of Northwest Mexico resembles the transverse-pen house of the western United States. This house has a low-pitched gabled-roof with the door opening under the gable. 7

The pedigree of the Tarascan troje remains in controversy. Drawings from the Relación de Michoacán suggest that the corner-timbered house does follow an indigenous form; these show rectangular houses with hipped roofs and the door in either the side parallel to or perpendicular to the ridge. Stone and adobe, however, formed the walls and thatch the roof. But, corner-timbered houses showing a remarkable similarity to the troje are found in many parts of
central and western Europe; these steeply-hipped shake-roof farmhouses with hewn-log walls cannot be discounted as possible prototypes for the trojes of Michoacán.

One element of the troje, the loft (tapanco), deserves special attention. Most aboriginal groups in Mexico store grain harvests in separate granaries, and the groups (in Northwest Mexico) that have recently received the loft have retained the separate granary tradition and use the loft solely for the storage of incidental effects. The Relación de Michoacán mentioned the use of trojes for storage but did not describe them or associate them with the house; they seem, from the Relación, to have existed as independent structures. The introduction of the loft, which is found throughout Europe, must date to an early time as no concept of a separate granary now exists in Michoacán; but, as noted in Chapter II, the troje itself serves as a storage facility.

The notching techniques recorded in Mexico are simple and non-distinctive. The most complex, the double notch joint, is found throughout central and western Europe, its distribution forming an arc from Sweden, where it has its most elaborate development (Erixon, 1937), to southwestern France (Kniffen and Glassie: 57). As a result, tracing its origin to a particular part of Europe seems impossible. Furthermore, the distinct possibility that this form of joining the timbers may be the crude copying by the
indigenous peoples of a more sophisticated technique initially introduced to Mexico cannot be disregarded (see note 18). However, the association in Michoacán of corner-timbering with hewn-plank construction and the vertical walls replicate two characteristics of corner-timbered log work in the hardwood areas of central Europe (Erixon: 28-29), and examples of notching forms similar to those of Michoacán are characteristic of Switzerland (Glassie, 1968b: 350) and western Austria (Phleps: 59).

Corner-timbering techniques in Northwest Mexico and the Naranjos Valley involve a single notch on the top of the log, but this same notching form was used on some log houses in Texas (Wilhelm: 53) and New Mexico (Gritzner: 56, 61). The single notch on the bottom of the log noted in the Chamal Valley, is a distinctly American trait, occurring throughout the Upland South.

Folk terms applied to the log house suggest no relation to other areas; most terms apparently involve the application of the Spanish or Mexican term most descriptive of the particular trait.

Although these conclusions are largely conjectural, they do suggest origins for log construction in various regions. The paseo house, the single-crib barn, and the saddle notch on the bottom of the log in the Chamal and Naranjos Valleys and the transverse-pen house and the single notch on the top of the log in Northwest Mexico apparently
derive from the United States. The origins of the Tarascan *troje* and the single-room, gabled-roof houses of Northwest Mexico and the Chamal and Naranjos Valleys remain in controversy—the latter may represent indigenous, gabled roof structures or even degenerated forms of the gabled tile-roof house of central and southern Mexico. The analysis of corner-timbering remains speculative—the simple forms found in Mexico occur throughout Europe suggesting an origin from there, or they may represent the degeneration or crude copying of any number of notching techniques that may have originally been introduced to Mexico.

**Accounts of Colonial House Types**

The early Spanish chroniclers noted adobe and stone as the materials most frequently used for wall construction in pre-Conquest Mexico. Subsequent *Relaciones* and *Descripciones* covering the colonial and early independence periods described these same materials for specific areas; this negative evidence, suggesting the absence of log construction, contributes to the determination of the earliest possible date for the introduction of corner-timbered log work to these areas.

For the Sierra de Puebla, a 1581 description of Zacatlán noted that "ay muchos árboles alrededor deste pueblo de Zacatlán donde sacan madera para tablas y vigas. . . .," but "las casa son de adoves . . . son cubiertas
de paxa . . ." (Carrión: 40-41). The 1609 "Descripción de Guauchinango" (172) mentioned that "las casas del son de pajizas y muy humildes. . . ." Around Zacualtipán, the earliest Relación, describing the houses of Tianguistenango and surrounding towns, dates to 1609: "... las casas son de palizada y barro . . ." (Relación de Tianguistenango). An 1825 visitor noted Zacualtipán "a town of 4000 inhabitants, with many of its houses built of stone and the roofs composed of wooden shingles" (Beaufoy: 58). In 1826, Edward Tayloe described the area around Zacualtipán: "We . . . are now in a climate where warm stone or log houses are absolutely necessary." He further mentioned: "We took our supper clustering around a fire in an adjoining log hut" (Gardiner: 183). Although this may possibly refer to corner-timbered log work, Tayloe probably meant houses of vertical log construction (palizada). Subsequent descriptions of Zacualtipán do not mention any log construction for the area; for instance in 1836, Burkhart (55) noted that "seine meisten Gebäude sind von stein . . . gebaut . . .," and in 1865, Bullock (377, 383) described "mud tenements" and "mud hovels" as the standard mode of housing.

Accounts from the Oaxaca area also make no mention of log construction; the 1580 Descripción de Guautla from the Mixteca Alta noted: "... las casas en que viven son las paredes de adobes y piedra blanca con cal cubiertas de madera y azotea algunos de paja." Descriptions of the same
materials characterize the reports from other highland Mixtec towns. The 1609 Relación de Miquatlán (13-14) likewise mentioned the houses as "pequeñas y bajas labradas de adobes y barro sin mezcla de cal, cubierta de paja, aunque algunas de ellas de terrado. . . ." Burgoa's 1670 account (II, 169) described the dominant use of adobe brick and thatch roofing in native houses in the Sierra de Mije.

Reports from Northwest Mexico suggest an absence of horizontal log construction into at least the early nineteenth century. The 1678 "Relación de las misiones" (Zapata: 329, 331, 332) of Carichic, Sisoguichic, and Temáchichi described the mission churches as of jacal, most likely vertical stick or vertical log. Other descriptions from the late seventeenth century corroborate these; in 1681, Joseph Neumann noted the houses of the Tarahumara as "made of straw and branches;" and in 1683, Juan Maria Ratkay (27) described the houses as "round in form" and "either thatched with straw or . . . covered with mud in a haphazard way." The Relaciones Geográficas compiled in 1778-81 mentioned stone, adobe, and vertical stick or vertical log structures. In Cuicihuirachi of the Tarahumara Alta, "se halla la Yglesia parroquial . . . de piedra y adobes aunque la mayor parte es adobe; con otras varias casas y xacales de la misma." In the mission of Coyachi, "los naturales tienen sus cacillas y xacales de terrado." The Relación de Navogame indicated a familiarity with wood on the part of the natives,
but it seems doubtful that such implied a knowledge of horizontal log work: "... los pinos y tascates ó pinoverteres son maderas aptas para formar casas,..."

Although these descriptions would suggest the absence of horizontal log construction in these regions, the conclusions need qualification. First, the accounts in most instances concentrated on the well-travelled routes; not until the later nineteenth century did ethnographers and natural historians move off the main roads into the sierras to visit isolated areas on which the remnant distributions of corner-timbered log construction today focus. Second, the actual descriptions necessitate caution. Mere absence of mention is no firm evidence of the non-presence of log houses, for the observer may have overlooked them for one reason or another; the literature offers many examples of this.

Although these descriptions require cautious assessment, they should elicit some preliminary conclusion. Corner-timbering was perhaps introduced in the sixteenth century into Michoacán and possibly to parts of the Sierra de Puebla, but in certain other areas, as suggested by the above descriptions, the absence of such construction persisted into later centuries. Stone and adobe and vertical log (jacal) apparently dominated at least into the early seventeenth century in Zacatlán and Huauchinango in the Sierra de Puebla and in Oaxaca, into the late eighteenth
Century in Northwest Mexico, and into the mid-nineteenth
century in Zacualtipán. Additional data will probably
modify these conclusions, but, at present, they do hint at
the earliest dates for the presence of corner-timbered log
construction in parts of Mexico.

**Earliest Mention of the Log House in Mexico**

Francisco Clavijero, in the *Historia antiqua de México* (231), published initially in 1780, made the earliest
mention of corner-timbered log construction in Mexico. He
described the granary used by the Indians:

> Sus trojes eran cuadradas y por la mayor parte de
> madera. Servíanse para esto principalmente del oyametl,
> que es un árbol altísimo y muy derecho, de tronco
> redondo, de corteza sutil y lisa, de pocas ramas y muy
> delgadas y de una madera correosa y difícil de romperse
> y de apolillarse. Formaban estas trojes sobre un en-
> vigado de pino disponiendo en cuadro los troncos de
> oyametl hasta la altura que querían, sin más labor que
> unas muescas o hendiduras que les hacían cerca de las
> extremidades para encajar un tronco en el otro y unirlos
tan estrechamente que no permitiesen el paso a la luz. En
> llegando el cuadro a la altura que habían determinado
darle, lo cubrían con otro envigado de pino y sobre él
> formaban el techo para defender el grano de la lluvia.

Clavijero gave no specific information as to the location of
these granaries, noting only that they were at a distance
from the Valley of Mexico.°

Although Clavijero's published mention of corner-
timbered construction dated only to 1780, his observations
undoubtedly went back to his youth, probably to at least the
mid-1740's. However, the earliest dated mention of log
construction occurred in the mid-eighteenth century; another Jesuit, Joseph Och, described log houses in the town of Las Vigas in 1755: "This place is named 'logs' [vigas] because all houses are made of logs, placed one upon the other...."

Subsequent accounts from other areas indicated an apparently well-established log tradition through parts of central Mexico by the mid-eighteenth century. The 1789 Calderón Report from the Tarascan Sierra of Michoacán described horizontal log work: "... las casas son jacales de ... vigas horizontales, cubiertas de tejamanil." Apparently this construction form had begun to encroach into the areas dominated by vertical-log construction, for the Report included mention of "jacales de estacas plantadas" which no longer occur in the area.

The Relación de Justlahuaca from 1777 suggests the presence of log construction in the Mixteca Alta of Oaxaca; it described the vegetation and the uses to which it was put: "... adornan las montañas y serros ... árboles de pinos, encinos, madreños ... sirven sus maderas principalmente para fabricar casas, tantos en las paredes, como en los techos ..." (Paso y Troncoso, 1950: 39). Based on the lack of detailed description of the building form and the evidence noted above indicating the absence of horizontal log construction in the Mixteca Alta into the seventeenth century, it seems more probable that this very general statement referred to vertical rather than to corner-timbered log work.
In summary, these three early accounts suggest a well-established distribution of corner-timbered log construction in parts of Michoacán, in Las Vigas in the Perote area, and in some undetermined part of central Mexico by the middle to late eighteenth century. Clavijero's description of the corner-timbered troje as an indigenous trait implies that it had a wide distribution when he began his observations and would suggest that the technique dated to at least the late seventeenth or early eighteenth century. If corner-timbering is not a pre-Columbian trait, initial introduction took place in the approximately 180 years between Conquest and the end of the seventeenth century.

**Initial Introduction of the Log House into Central Mexico**

In 1519, Cortés began the conquest of the Aztec tribute state; within the next three decades Spanish conquistadores had solidified Iberian control over much of central and southern Mexico and were beginning to move up the plateau following the silver veins of the two-pronged Sierra Madre that forms the backbones of eastern and western Mexico. The aboriginal population bore the brunt of the Spanish advance—militarily, politically, economically, and spiritually. Forced labor, mistreatment, epidemic disease, and natural disasters brought about the devastation of the
Indian population during the early colonial period. The drunkenness and apparent resignation to death in the indigenous population of New Spain, as a result of the traumatic disruption of the native culture, reflected the widening crack in the stability of the Indian community, breaking open a relatively closed system and preparing it to receive many new elements introduced with the Spanish Conquest. The carriers of European culture passed these elements on, consciously and unconsciously. The missions had responsibility for large groups of Indians; the fathers inculcated them with European religion and virtues and introduced to them many new material culture elements. Labor drafts, the *encomienda*, later the *repartimiento* (which obliged the aborigenes to provide various services or labors for ranches, farms, and mines as well as for public works), and the free labor arrangements (which induced the natives to move to new areas to work the mines and secure other employment), of necessity brought the Indians into close contact with aspects of European culture. The Spanish tried to make use of native craftsmen by assigning them to activities commensurate with their abilities, which allowed the Indians to quickly acquire new skills: "... con solo estarlos mirando sin poner la mano en ella, quedan maestros como adelante diré" (Motolinía: 91). Apparently during this period, marked by the disruption of Indian life and the invasion of foreign cultures, the corner-timbered log house
was introduced as a new feature in the Mexican landscape.

Critique of Established Hypotheses

Scholars have put forth several theories to explain the presence of corner-timbered log construction in Mexico. The first attributes its introduction to Spanish colonists from the northern provinces, a second to missionary priests from central Europe, and a third to immigrants from Japan.

Introduction by colonists from Spain

Studies of passenger lists of ships proceeding to the New World in the sixteenth century reveal that the northern provinces of Galicia, Asturias, and Cantabria did not contribute an undue percentage of colonists (Friede; Pérez Bustamente), although a number of Basque miners did emigrate to New Spain during colonial times (Neasham: 160; West, 1949: 6), and about 170 Basque soldiers accompanied Francisco de Ibarra in his exploration of northern Mexico (Neasham: 160). Basques also settled in Michoacán in some number; Lumholtz (II, 448) said of Pátzcuaro: "The 8000 inhabitants came originally, for the most part, from Biscaya. . . ."

Whether log construction came from Spain depends on whether corner-timbering was present in the country during the sixteenth and seventeenth centuries. Log work has been reported from the Rhone Valley and may have had a distribution reaching into the Pyrenees and the northern provinces.
of Spain, but no evidence supports the contention that log houses were ever built in these latter areas. Recent descriptions of house types in Galicia and Asturias mention "white-washed granite cottages roofed with red tiles" (Meakin: 233-34), and accounts from the Basque provinces report stone-walled houses. Wood construction, however, was present in the latter area as late as the 1830's: "... attached to each house is a magazine, or small building of wood, exactly a miniature of the common Swiss cottage ..." (Widdrington: I, 81). Caro Baroja (276) has further contended that wooden houses predominated in the Basque country in the fifteenth century, but he provides no information on the form of construction. Although these accounts might suggest the presence of corner-timbering, they do not confirm it. Some of the granaries (hórreos) of northern Spain have plank walls, but these are not corner-timbered; their construction perhaps indicates the form of building in wood throughout Spain (Torres Balbás: 238):

... formados de gruesos y anchos tablones, llamados colondras (de column, apoyo), puestos verticalmente y que se unen entrando uno en el otro en forma de machihembras. En algunos lugares, como por ejemplo, en Viego, las tablas se ponen también horizontalmente y entran en los cuatro pilares de las esquinas puestos verticalmente.

A further point militating against the hypothesized introduction of corner-timbered log work from Spain is that log construction used by the Spaniards in most parts of the New World involved vertical, or palizada, log work and not
corner-timbering (Mercer: 572).

Introduction by missionaries from central Europe

The Spanish colonial office was seemingly very selective in regard to immigration, seeking to prevent the entrance of non-Spanish and non-Catholics into New Spain. Still, numerous individuals of foreign extraction, such as John Chilton, did arrive in Mexico, spend some time, and, in many cases, subsequently recorded their experiences. Some foreigners, such as the Crombergers of Mexico City, even attained important positions in the colonial community (Pfederkamp: 9). But, it seems improbable that any major settlement of foreigners, with a few exceptions, took place in Mexico prior to the nineteenth century.

A number of non-Spaniards did enter Mexico as missionaries; one well-documented group of priests, Jesuit fathers who staffed the missions of northwest Mexico, included a number of German and Czechoslovak priests, who arrived during the latter decades of the seventeenth century and toward the middle of the eighteenth century (Treutlein; Odlozlik). A second hypothesis contends that these priests of central European extraction, probably acquainted with log construction, introduced corner-timbering to the Indians. However, a few points must be considered in regard to this thesis. First, a majority of the missionaries apparently served in out-of-the-way places
in Sinaloa, Sonora, and the Californias (Treutlein: 230),
beyond the zones of log construction and removed from the
sources of the necessary timber. Second, even in the
sierran areas, log apparently did not provide the construc­
tion materials. Ratkay (1683: 22) described the structures
in the Tarahumara missions: "The houses and churches are
built of unbaked bricks, that is, of earth mixed with straw
and shaped into bricks." Joseph Neumann in 1681 (25) noted
the materials and method of building at the Sisoguichic
mission with some detail:

For in these countries the fathers themselves are the
only architects, and the Indians are the only masons.
For the churches and the dwelling houses of the fathers
the Indians make large bricks of the earth; they are not
baked, but merely dried in the sun. With these they
erect very good buildings. Because of the scarcity of
baked bricks and of lime, and the lack of skilled masons,
these sun-dried bricks are the only building material
used, even in the Spanish towns and among the nobility.
All the houses, even the largest, are of one story;
they are roofed with clay tiles. . . .

Introduction by Immigrants from Japan

A third hypothesis suggests Japan as the source
of the log tradition and intercourse between Japan and
Mexico fostered by the Manila galleon trade as the means by
which it diffused to Mexico. Wood construction has a long
history in Japan; construction of the shosoin (a log store­
house) goes back to the eighth century A.D. (Sadler: 23),
but corner-timbering (azekura) (Sadler: 24) undoubtedly has
a much greater age. Wood shingles that form the noshi roof
date to at least the Heian period of the eighth to twelfth
centuries A.D. (Sadler: 33, 53). One architectural feature, the considerable use of elaborate woodcarving for decoration of roof beams and other house parts, prevailed in Japan during the sixteenth and seventeenth centuries (Sadler: 65-66), the period of most probable contact with Mexico; it shows a marked parallel to the Tarascan tradition of decorating the *trojes labradas*.

Indirect trade between New Spain and Japan, by way of the Philippines, began in 1586 (Schurz: 114); but the earliest recorded direct contact between the two lands occurred in 1610, when 23 Japanese merchants accompanied Vivero to Mexico and spent five months there (Nuttall: 10, 46). In 1614, 180 Japanese spent four-and-a-half months in Mexico, travelling to the capital and Veracruz, and a majority of these presumably remained in Mexico the six years during which part of the delegation journeyed on to Europe (Nuttall: 42, 46; Schurz: 127). In 1620, a Japanese vessel arrived in Acapulco; it delivered its cargo and returned with the last group of Japanese, marking the end of direct Japanese contact with New Spain (Schurz: 128).

Although intercourse between the two lands was not extensive, opportunities did exist for the migration of small groups of Japanese to Mexico. Possibly some Japanese in the delegations mentioned above remained in Mexico (Nuttall: 43). Documents furthermore mention the arrival of Japanese *naos* and crews in Acapulco (Núñez Arteaga: 86),
and probably some ships returned to the orient without their full complement of Japanese seaman. In 1624, the new Japanese emperor, Iyemitsu, ended this era of relatively friendly relations by outlawing Christianity and expelling priests and religious from the empire (Nuttall: 43); the Japanese and Mexican priests and probably many laymen fled to the Philippines and possibly to Mexico as well (Nuttall: 46). These 22 years of contact perhaps allowed the movement of Japanese people and material culture traits to New Spain: ". . . it is far from improbable that among the Japanese may have been takumi and toryo, craftsmen and master carpenters, who moved to Mexico" (Guzmán-Rivas: 33).

The possibility of a Japanese origin for the log house in Mexico cannot be totally disregarded at this stage, but certain supportive evidence merits closer attention. (1) The colonial government opposed any official migration of orientals to Mexico, which would inhibit the movement of large, well-established groups carrying Japanese culture to the New World. (2) What possible settlement of small groups of Japanese probably occurred in the coastlands around San Blas and Acapulco, the principal galleon-trade ports, and along the route from Acapulco to Mexico, rather than in the highland areas of Michoacán, 200 to 300 miles distant from these entry points. They were apparently assimilated, for the most part, by the indigenous population of the coastal lowlands. (3) Evidence supporting a Japanese source for
corner-timbering relies on analogous introduction of oriental culture elements, such as the Mongolian still and the palm-leaf raincoat; these, however, occur in the Philippines and probably trace to that origin—direct trade contact between Mexico and the Philippines began in 1565 and lasted throughout the colonial period—or else are found in central Europe as well. The Japanese impact, if any, was short-lived and probably involved a very few individuals. It is doubtful that the origin of corner-timbering in Mexico can be traced to this source.

Author's Hypothesis

After solidifying their hold on the areas of New Spain, the conquerors quickly turned their attention to the exploitation of the land, especially in search of gold and silver. Knowing very little about mining, the Spaniards had to rely on foreigners for the knowledge necessary to profitably work the silver mines. As early as 1524, during the reign of the Hapsburg monarchs, German miners had arrived in Spain to work the mines of Almadén (Quelle, 1939: 4). About fifty German miners, sent to the New World, arrived on the island of Haiti in 1528 (Quelle, 1938: 101); another group, reaching Mexico in 1536, settled in the mining center of Sultepec (West, 1949: 16). The exact origin of these latter miners remains unknown, although they apparently came from one of two areas. Sent over by the
banking house of the Welsers, the Germans may have come, as inferred from Arciniegas, from the Bohemian mines of the Sudeten (78) or from Tyrol, where the Welsers also operated mines (66). The immigration of Germans to Mexico apparently slackened by the early seventeenth century, due in part to the growing activity of the Inquisition and its decisions against some Germans in 1602 (Pfederkamp: 31). The author hypothesizes that this group of German miners settling at Sultepec introduced corner-timbering into central Mexico. No documentation supports this explanation; but it seems feasible in light of circumstantial evidence and the early introduction of the tradition to central Mexico, suggested by the eighteenth century descriptions of it by Clavijero, Och, and Calderón.

Corner-timbered log construction has been known in both the Sudeten and Tyrol areas. It is not unlikely that the German miners, familiar with such log work, built dwellings and other structures of logs in the Sultepec area, making use of, for the first time on the American continent, the technique of corner-timbering.

Indian laborers were present in the Sultepec area during the German presence. A series of ordinances of 1536 compiled for the purpose of insuring "buen tratamiento de los naturales libres y esclavos que sirven y andan en las minas de la plata" (Mendoza: 52) acknowledged the apparently accepted use of native laborers in the mines of New Spain.
and the Indians were used in the mines of Sultepec from the time of their establishment (Zorita: 268). The native workers usually spent about two or three weeks at a time in the mines (Gómez de Cervantes: 109), rotating in twenty-day cycles (Zorita: 268), after which they returned home. The Relación de las Minas de Sultepec from the late sixteenth century implied that Mexicans and Tarascans comprised the labor levies brought to the mines of Sultepec (Paso y Troncoso, 1905: VII, 9). Furthermore, the highland town of Aranza, very near the present distribution of log construction in Michoacán, provided part of the Tarascan laborers (West, 1948: 13). Involved with the construction of houses along with other activities at the mines (Motolinía: 20), the Indians came into contact with the new building method used by the Germans in which the timbers were notched near the ends and joined together. Quick to pick up new traits, the Indians acquired the technique and carried it with them when they returned to their homelands. The Tarascans carried it to Aranza (Fig. 15) and adapted corner-timbering to the construction of their houses; the trait spread from this hearth throughout the Tarascan highlands (Fig. 16). The Nahua introduced corner-timbering to presently undetermined parts of central Mexico (Fig. 15) and began using it in the construction of their granaries; whether it diffused from this hearth area is not known.
Fig. 15. Hypothesized dispersal of log construction in central Mexico.
Fig. 16. Hypothesized dispersal of log construction in Michoacán.
Juxtaposition of Indians and Germans at Sultepec does not explain the acceptance of corner-timbered log work by the Indians of Mexico. What process was operative that added it to the material cultures of the Tarascans of Michoacán and the Nahua of central Mexico? George Foster (228-29), in his study of the impact of the Spanish Conquest on Mexico, has postulated two instances in which new elements entered the indigenous cultural inventories: (1) The new forms were superior to the Indian types or represented "a significant extension of their indigenous forms." (2) The Spanish traits had no counterparts in native society, or else the Indian counterparts were of a rudimentary nature. The acceptance of corner-timbered log construction, although not a Spanish trait, might well be explained by the first instance. The Indians of central Mexico were already familiar with log as a construction material; many groups built wood houses, using vertical or non-corner-timbered horizontal arrangements of the timbers. Although corner-timbering constituted a new form of wall construction, this efficient way of joining the timbers actually represented "a significant extension" of the traditional Indian log construction forms. Two other factors may have hastened the acceptance of corner-timbering: (1) The horizontal placement of un-notched wall members perhaps adumbrated the horizontal arrangement of the logs involved in corner-timbering. 14 (2) The introduction of the steel
axe increased the efficiency of native exploitation of timber resources, necessary for log house construction.

In summary of this hypothesis, German miners introduced corner-timbered log construction to Mexico in 1536 at Sultepec (Fig. 15); Tarascan laborers adopted the technique and carried it to Aranza in Michoacán from where it spread throughout the Tarascan sierra, and Nahua workers carried the technique to presently undetermined areas in east central Mexico, incorporating it in the native trojes.

**Introduction of the Log House into Perote**

Joseph Och mentioned in 1755 the presence of horizontal log construction in Las Vigas. Because of the marked similarity between the hipped-roof, log house of Perote and the Tarascan troje of Michoacán, it is hypothesized that the house form and corner-timbering diffused to Perote from the Tarascan highlands. Tarascan laborers, voluntarily and involuntarily, spread to many parts of Mexico in colonial times to work the mines and perform other labors. It is not inconceivable that a group of Tarascans settled in the area of Perote to work in the copper mines of Somelhuacan, just northwest of Las Vigas, and introduced the hipped-roof, log house to that area. No documentation yet uncovered reports this movement of Tarascans, but the replication from one area to the other of traits associated with the log house
indicates that the evidence may be expected to be found. From Somelhuacan, corner-timbering spread throughout the Perote region (Fig. 17).

**Introduction of the Log House into Oaxaca**

The earliest definite mention of corner-timbered log construction in the Oaxacan highlands dates to the late nineteenth century. Frederick Starr (1900: 38) described the granaries of the Mixteca Alta as "usually of logs set horizontally and built up in a crib-work . . . ," and photographs in his ethnographic album (1899: Pl. 58) show corner-timbered house walls as well. Although a 1777 Relación suggested the presence of log construction in the eighteenth century, such an early introduction seems doubtful. Peña (129) contended that the traditional house types of the Mixteca Alta were of *jaulilla*, circular in floor plan, and topped by a conical roof of thatch; the introduction of rectangular houses of log followed the revolution: "... de la revolución a esta parte [the Mixteca Alta] se las viene sustituyendo con casas rectangulares, de bajareque, morillo ó rajas de encino. . . ." Horizontal log walls necessitate the transition to a rectangular floor plan; it seems that the construction of the corner-timbered house in the Mixteca Alta dates to about the middle nineteenth century. Apparently the introduction of the log technique took
Fig. 17. Hypothesized dispersal of log construction in Perote.
place in the eastern part of the Mixteca Alta, whence it gradually spread westward. An 1871 account of Tlaxiaco and Chalcatongo failed to mention the presence of corner-timbered log work, implying that it had not reached there or had not attained a significant distribution: "En el centro de la población las casas son generalmente de terrado y en los barrios de tejabanes y jacales" and "cuatro ó cinco casas tiene de terrado y los demás son jacales de techo de paja" (Vázquez: 240, 247).

Starr (1900: 54) also gave the first description of corner-timbered log construction among the Mije: "Farm houses near Ayutla are well-built log houses. . . . Neat granaries are seen in most Mixe towns; they are commonly built of logs arranged in a crib-work, set well off the ground on four posts and thatched."

The supposed mid-nineteenth century introduction of corner-timbering to the Mixteca Alta approximates that of the establishment of German mining activity in Oaxaca. The Mexican Mining Company began operation in the Zapotec highlands in 1825; adopting German mining techniques, it imported a large contingent of European personnel. In 1826 and 1827, about 100 Germans, in "all manner of occupations," settled at Yavesía (Schmieder: 56). They introduced certain architectural forms (Schmieder: 57):

... approaching Yavesía . . . one is astonished to find a type of dwelling in use among the natives that is unique in the area under study. The roofs of the
houses are steeply inclined and covered with shingles, and the upper part of the gables also shingled . . . one is obliged to assume German influence.

It is hypothesized that these German miners introduced corner-timbered log construction to the Zapotec highlands, and the technique spread from there to other areas of Oaxaca (Fig. 18).

The trait diffused southward to the area of Llano Grande and Cuajimoloya. Mixtec free laborers, working in the mines of Yavesía, learned and carried the tradition to the eastern Mixteca Alta, and the new form of wall construction spread westward across the Mixtecan highlands, eventually reaching the Triqui. Mine laborers may have carried the technique to the Sierra de Mije as well, but, based on Beals's conclusion (1960: 227-230) that some traits passed to the Mije by way of the Zapotec, the diffusion of corner-timbering may have followed the latter route instead. The absence of corner-timbered houses among the Zapotec may be a recent phenomenon, the few log structures now noted in the Zapotec highlands being vestiges of a former distribution of log work that has since been replaced by plank construction.

Introduction of the Log House into the Sierra de Puebla

The earliest mention of corner-timbered log construction in the Sierra de Puebla apparently came from
Fig. 18. Hypothesized dispersal of log construction in Oaxaca.
Huayacocotla in 1869: "Sus casas . . . estan fabricadas, en general, de gruesas vigas, y techadas de tejamanil" (Soto: 174). In 1900, Starr (1908: 242) described the houses along the road between Tulancingo and Huauchinango as "log structures with shingled, four-pitched roofs. . . ."

The impact of the nineteenth century mining centers on the regions they occupied varied with the agents of cultural transmission; the mining companies for the most part brought over only managerial personnel. Ward (1828: II, 77) noted that the German mining center at El Chico (north of Pachuca) sought to "make the management strictly European, while the operative part is confided to natives. . . ." Still, exceptions occurred at Yavesía in Oaxaca and at Encarnación in the Sierra Madre Oriental northeast of Zimapán. Ward (1829: 125-26) noted that "the German company has sent to Silesia for fifty men acquainted with iron works, and they intend to establish a foundry near the Encarnación. . . ." Subsequent writers established their arrival, mentioning that the iron mines of east Mexico were "being worked principally by German miners" (Folsom: 58). It is hypothesized that this group of Germans at Encarnación introduced corner-timbered log construction to the Sierra de Puebla region.

The distribution of notching techniques (Fig. 5) indicates the pattern of diffusion of corner-timbering from the western part of the Sierra de Puebla area (Fig. 19).
Fig. 19. Hypothesized dispersal of log construction in Sierra de Puebla.
From Encarnación, the double-notch joint diffused southward to the plateau, then southeastward, skirting the mountains, to Singuilucan, then southward to Paredón, and then eastward to Zacatlán. Other lines of movement branched off to Zacualtipán, Huayacocotla, and Molango. From Zacatlán, the corner-timbering tradition, with the double notch having degenerated to a single notch on top of the log, moved northward through the sierra to Huauchinango and then northwestward to Honey, Tenango, and Huayacocotla. In all instances, the diffusion of corner-timbering followed the major lines of communication, along the plateau and through the sierra; the very late introduction of corner-timbering to Zacualtipán, as suggested above, has no explanation. 15

Introduction of the Log House into Northwest Mexico

In 1849, John Audubon (117-118), travelling across Mexico to the gold fields of California, mentioned the presence of horizontal log construction in Chihuahua and suggested its origin: "It was a . . . most welcome sight, a log house looking so like home . . . but, . . . it was simply the house of a Mexican who had been in Texas some years, and had learned how to live in a little comfort." Corner-timbered log construction had reached Texas by the late 1820's; continued westward movement of Americans carried the tradition into New Mexico and on to Northwest Mexico, arriving in the last area no later than the 1840's.
Three landscape traits in the Northwest support the hypothesis of introduction of corner-timbering from the United States: the house types and the notching technique, noted above, and the worm or zig-zag fence. A 1931 account (Zubira y Campa: 75) mentioned the presence of the zig-zag fence, a type frequently associated with pioneer America, in the sierra west of Durango: "Otra cost típica . . . son los cercados construidos con largos troncos de pino, puestos horizontalmente y trabados a lo largo del potrero en forma de zig-zag."

The first decades of the second half of the nineteenth century saw numbers of Americans from the southwest United States moving into Chihuahua and Durango as American mining and lumbering companies began to exploit the rich sierras. Also, former Confederates, who fled Dixie following the Civil War, established American colonies in the area (Oswald: 45; Harmon: 459). All of these movements, introducing corner-timbering at a number of different points, contributed to the rapid spread of log construction through the Western Sierra Madre. The probable multiple introductions of corner-timbering into the region make difficult, if not impossible, any attempt at tracing diffusion.

Two questions, however, complicate this simple explanation of the introduction of corner-timbering into Northwest Mexico. First, is it possible that the corner-timbered log house could have been accepted so completely
by the Tepehuan of Chihuahua within the two or three generations between its introduction and the visits by Lumholtz and Mason? Pennington's study (1969) of the material cultures of the Tarahumar and Tepehuan suggests that the latter have been subject to considerable mestization and thus open to acceptance of new elements. Certain material traits such as dress and household articles reflect non-indigenous origin, and this openness to change may explain the widespread occurrence of log construction among the Tepehuan. Second, to what degree have the Tarahumar accepted corner-timbered log work? This group has traditionally been a withdrawn, conservative people, although they have accepted and amalgamated many foreign elements with parts of their culture. Lumholtz (I, 177) noted that circular granaries of stone and mud, apparently the ancient form of construction, occurred more frequently than the corner-timbered granaries, and Pennington (personal communication) still notes that the Tarahumar log houses and plank granaries have restricted distributions corresponding to areas of strongest acculturative influence. The diffusion of the new construction forms introduced by Americans or Mexicans has undoubtedly relied on the acceptance of the log house by the large population of mestizos in the sierran areas rather than by the indigenous groups.
Introduction of the Log House into Northeast Mexico

Horizontal log construction appeared around the turn of the century in the Chamal and Naranjos Valleys. In 1903, American settlers from Oklahoma and Texas established a colony at Chamal in Tamaulipas and, a few years later, another around San Diequito in the Naranjos Valley of San Luis Potosí. These colonists initially built houses of corner-timbered palm logs; a dwelling in the town of Chamal was described as "a double room house built of logs and covered with native shingles (palm leaves) . . ." (Frazier: 4). After about a generation, Mexicans began copying the American building techniques, and the tradition has spread beyond the hearth areas (Fig. 20).

Corner-timbered log work has been adapted to the established house forms, except in the case of the dog-trot or paseo house, a type introduced directly from the United States. Why was it accepted by the indigenous population? Cabrera (121) mentioned the practice in pre-log house days of using the house porches (portales) for a great deal of family activity: "La gente, principalmente en el verano, duerme en los portales que dan a la calle, y en todos tiempos se ven en los frentes de la casa, sillas, bancas, u otros muebles que estan allí continuamente." The hallway of the two-roomed house performed this function and perhaps provided a more satisfactory arrangement of the house, making
Fig. 20. Hypothesized Dispersal of log construction in Chamal and Naranjos Valleys.
the *paseo* type a popular dwelling.

Elements peculiar to the Chamal Valley include the saddle notch on the bottom of the log, a distinctly American trait, and a structure that closely resembles the single-crib barn of the Upland South tradition. These, along with the single notch on top of the log and the *paseo* house occurring in the Naranjos Valley, strongly point to diffusion of corner-timbered log work to both areas from the United States.

Log construction was introduced to Northeast Mexico by an American hacendado from Paris, Kentucky, who took over the hacienda of Pablillo in the 1880's. John Hibler introduced a number of material culture elements from Kentucky along with corner-timbering. The log tradition spread northward beyond Galeana toward Arteaga, spilled out onto the eastern edge of the Mesa Central, and spread southward, skirting the Sierra Madre Oriental (Fig. 21). The northward dispersal of the technique was probably enhanced by the disruption of the hacienda system after the Revolution and the movement of many peons away from the former hacienda lands.

**Summary**

The presence of the corner-timbering tradition in Mexico has resulted from multiple introduction, as suggested primarily by the considerable regional diversity of house forms, notching techniques, and folk terms. This study has
Fig. 21. Hypothesized dispersal of log construction in Northeast Mexico.
hypothesized the initial introduction of the technique in 1536, when German miners settled in the mining center of Sultepec in central Mexico. Tarascan and Nahua laborers acquired the technique and carried it to Michoacán and to parts of central Mexico respectively. The great similarity in house form and function and notching technique suggests that Tarascans carried the tradition to the area of Perote, where horizontal log was first noted in 1755 at the village of Las Vigas. Introduction of log construction to other areas occurred during the nineteenth century and later. It is hypothesized that German miners in the 1820's introduced corner-timbering to Oaxaca; from the Zapotec highlands it spread by various processes to the Mixteca Alta and the Sierra de Mije. Corner-timbering arrived in the Sierra Madre Oriental, being brought by German miners to Encarnación, in the 1820's and spread southeastward along the plateau to Zacatlán and then northward through the Sierra de Puebla. Americans carried the concept of horizontal log work from the southwest United States to Northwest Mexico during the middle and late nineteenth century and introduced corner-timbering to the Chamal and Naranjos Valleys at the turn of the century. An American *hacendado* was instrumental in bringing the log technique to Northeast Mexico in the 1880's.

In each instance, the introduction of corner-timbering to a particular region resulted from the migration
to that area of a group whose cultural inventory included notched-log construction. Indians or mestizos in each hearth area (zone of initial introduction and adaptation of a new trait) learned the technique and passed it on; stimulus diffusion accounted for the subsequent dispersal of corner-timbering in each region. As diffusion usually follows major routes of communication, these, represented by the present-day highways, provided the basic pattern for the lines of dispersal noted on each regional map.
1. Summaries of present distributions and types and the history of corner-timbered log work in the Old World occur in Erixon; Kniffen and Glassie (53-58); Griesebach; Phleps; Smiatowski, and Weslager (84-95). For specific information of corner-timbering in prehistory, see also Gimbutas (1965: 204, 302-03, 596) and Gryaznov (90, 135, 155).

2. Summaries of the early history and westward movement and types of corner-timbering and log houses in the United States occur in Kniffen and Glassie (53-66); Glassie (1963 and 1968); Weslager (3-45); and Wright. See also Mercer; Shurtleff; and Nixon (29, 32).

3. Anglo-Americans had entered Texas, settling at Nacogdoches, in the late eighteenth century (Bancroft: 5; Meinig: 34-37). A map, apparently from the eighteenth century although no date occurs on it, of Las Adaes, east of Nacogdoches has drawings of corner-timbered log houses (Loomis and Nasatir: 112), and the earliest corner-timbered log house in Texas, that of Gil Ybarro, dates to 1770 (Wright: 3). Anglos had apparently introduced log work at least into east Texas prior to the nineteenth century, but not until the 1820's did large groups of Anglo settlers (the Austin colony) move into central Texas, carrying the log tradition with them. For additional information on the log house in Texas, see Visit to Texas (30, 31, passim.); Alexander (11-15); Connor; Cotton; and Evans.

4. Barrett (120, 121, passim.) mentions the use of log construction in the forts built in West Texas to protect American settlers in that area. Frobel (287-88) noted the presence of an American colony in eastern New Mexico in the 1850's, although he did not describe the houses. The American population of New Mexico, however, was probably of considerable size even prior to the Mexican War of 1846. The Santa Fe trade, a thriving activity during the period from 1820 to about 1840 (Billington: 25), brought many Americans to New Mexico; they settled at Santa Fe and probably along the Trail, as well. A few Americans were beginning to move into Chihuahua, also, probably as early as the 1830's.

5. The marked similarity between the houses of the Mixteca Alta and the Sierra de Mije indicates another exception to the discontinuity of house types from one region to another. This exception, however, will not be brought
out here, because it apparently involves a similarity of dwelling forms established prior to the introduction of corner-timbered log work and thus not pertinent to this discussion. Apparently, a single folk house type dominates the highland and lowland areas of Oaxaca. Corner-timbering has been adapted to this single hipped-roof, folk dwelling form in each area.

6. A statistical test to analyze the variance between and among the dimensional data of hipped roof houses in Michoacan and Perote revealed no significant difference between the house measurements. The analysis of variance tables for the house width and depth are shown below.

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<th>Degrees of Freedom</th>
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<tr>
<td>Total</td>
<td>36,833</td>
<td>32</td>
<td>2,070</td>
<td>1.85*</td>
</tr>
<tr>
<td>Among</td>
<td>2,070</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>34,762</td>
<td>31</td>
<td>1,121</td>
<td></td>
</tr>
</tbody>
</table>

*F .05 at degrees of freedom 1, 31 is 4.16.

7. The transverse-pen house has a distribution extending from Canada (Spencer and Thomas: 235) to northern New Mexico (Gritzner: 183); it was apparently one of the major pioneer log house types in the western United States.

8. Log structures with steeply-hipped roofs occur in Yugoslavia (Spencer and Thomas: 245; Lodge: 95; Thurner: 83), eastern Czechoslovakia (Street: photograph facing 161), western Austria (Phleps: 5), and northern Switzerland (Atlas der Schweiz: tafel 37).

9. Clavijero was probably describing the log granaries of the Nahua, an Indian group who occupied large portions of central and eastern Mexico; the exact location of the granaries, however, remains unknown. Although the
Trojes represented one of the initial uses of corner-timbered log work in Mexico, the unresolved question of their location precludes their value in mapping the early distributions of corner-timbering in Mexico. The use of their hypothesized location in a conjectural argument such as follows would only debilitate the conclusions resulting from that argument. The Nahua laborers, contemporaneously with the Tarascans, acquired the technique of corner-timbering from the Germans at Sultepec and apparently adapted it to their granaries in some undetermined area in central Mexico.

10. The Relación de Tancítaro may provide an even earlier mention of corner-timbering in Michoacán; it described the town's church in 1570: "Tiene la iglesia bien labrada de madera de muy buenos pinos y toda encalada." Also, around Tancítaro, "ay hermosos pinos y robles para edificios de casas . . . (Bernal: 213, 210)." Although corner-timbering had possibly arrived in parts of the Tarascan Sierra by the middle sixteenth century, this statement probably referred instead to vertical log construction.

11. San Blas did not become a port for the Manila galleon until 1768 (Guzmán-Rivas: 17), but ships from the Philippines had been putting into the Bay of San Blas for supplies from earlier times. A mid-seventeenth century account mentioning slaves and fugitives that had fled into the Sierra de Nayarit, the highlands adjacent to San Blas, suggested that many orientals had fled the galleons at the first supply stop. Supportive evidence of this is the Mongolian still, used by the Huichol of the Sierra de Nayarit, that was apparently introduced by Filipinos fleeing into the highlands from the galleons that put in at San Blas (Bruman: 427).

12. Guzmán-Rivas (33) suggested that such Tarascan traits as the portón and enclosed courtyard, neither appearing in the drawings from the Relación de Michoacán, were introduced after Conquest, possibly from Japan where similar traits occur. Another trait suggesting Japanese influence is the elaborate woodcarving on the troje labrada. However, paralleling the occurrence of log house types similar to the Tarascan troje, examples of all these traits occur as well in Europe. The enclosed courtyard with the houses facing onto it and a covered entranceway usually leading into it from the street was present in southern Germany in the late seventeenth century (Zeiller: XIV, 42, 102) and have been noted in Czechoslovakia (Street: photograph facing 161), Yugoslavia and Rumania (Thurner: 84), and in Poland (Boyd: 128, 137, 158). Rumanian houses, besides having the
hipped roof and "verandah (prispa) on at least one side" and being surrounded by a high wall, are characterized by woodcarving that decorates especially "the pillars supporting the roof over the verandah" (Thurner: 75-76).

13. Wood-cuts from Agricola (337, 343) show log structures used as houses and storage buildings near mining activities in Germany; the presence of a corner-timbered quartel or storehouse in a pre-Revolution Río Blanco mining works in East Mexico near Pico de Orizaba was noted by Oswald (170): "... built in the orthodox back-woods style, rough-hewn logs laid cross-wise and filled out with a mixture of grass and adobe mortar." Neither of these provides direct evidence that the German miners built log structures at Sultepec, but they do suggest the association of corner-timbered log buildings with mining works in Germany and Mexico. Further support for German introduction of corner-timbering may be founded on the analogous introduction of many German mining techniques into Mexico during colonial times (West, 1949; Wagner; Quelle, 1938). However, this should not be overly emphasized, because the introduction of German mining techniques was actively supported by the colonial government, and the transfer of such traits occurred on an official rather than a folk level.

14. This perhaps explains the earlier adaptation of corner-timbered log work to the construction of granaries inferred from Clavijero's description of the log troje and the lack of mention of the use of such construction in houses. The Nahua granary, or "square cincolote, constructed of poles at the four corners connected by slender staves laid horizontally ..." (Trent: 256), perhaps adumbrated the corner-timbered arrangement of placing the timbers horizontally and hastened its acceptance for building granaries. Such a notion is buttressed by the fact that the name cincolote is applied to the corner-timbered granary.

15. Zacualtipán is situated on the main colonial route from Mexico to Tampico. It would be suspected that the log tradition would have reached there soon after its introduction at Encarnación, but negative evidence suggests the absence of corner-timbering at Zacualtipán into the mid-1860's. Perhaps Tayloe's account, interpreted as referring to vertical log construction, did record, instead, the presence of corner-timbering.

16. Information on the introduction of corner-timbering into the Chamal and Naranjos Valleys came from interview of the early residents of Chamal and their descendants,
especially Mr. and Mrs. M. A. Bateman, Mr. Daniel Cameron, and Mrs. Sylvia Taylor and from transcripts of early documents relating to the colony given to the author by Mrs. H. C. Stoops.

17. Information on the introduction of corner-timbered log construction into Northeast Mexico came from communication with Dr. Samuel Dicken and from interview of Señor Daniel Hibler, son of the American hacendado in Pablillo.

18. Stimulus diffusion is the process by which the idea of a new trait passes from one group to another in contrast to the transfer of a trait itself from one area to another by a migrating people. The former process was most active in the dispersal of corner-timbering in each region of Mexico, while the latter explains the movement of notched-log construction through the eastern United States. Stimulus diffusion usually involves the modification, frequently the simplification, of a trait during its transfer from one group to another; this perhaps contributes to the explanation of the very simple corner-timbering techniques now present throughout Mexico. Conceivably, more elaborate forms were introduced at each hearth area, but only the concept of joining horizontally-placed timbers by means of notching, not the corner-timbering forms themselves, diffused through the region. Instead of replicating the sophisticated forms of corner-timbering, builders used only simple, non-distinctive notches to join the logs at the corners. Again, this contrasts with the eastern United States, where sophisticated notching forms occur throughout the distribution of corner-timbering (see Kniffen and Glassie).
The construction and form of the folk house in Mexico result from the many cultural influences that the country has experienced since Conquest. A vital native culture underlies a strong manifestation of Spanish influence. Consideration must also be given in greater or lesser degree to the contributions of such cultures as North American, French, German, and possibly Japanese. The corner-timbered log houses represent particular folk types in the Mexican landscape; this paper has sought to determine their present distributions and to unravel their history.

Present Distributions

Four major distributions of the log house occur today in Mexico: the Sierra Madre Occidental of Northwest Mexico, the Tarascan Sierra of Michoacán, the Mixteca Alta and Sierra de Mije of Oaxaca, and four discontinuous zones in the Sierra Madre Oriental of East Mexico.

Four corner-timbering forms occur in Mexico, having disjunct distributions across the country. The double notch joint is present in Michoacán, the Mixteca Alta, Perote, parts of the Sierra de Puebla, and Northeast Mexico. The single notch on top of the log occurs in Northwest Mexico, the Sierra de Mije, parts of the Sierra de Puebla, the Naranjos Valley, and the northern periphery of Northeast
Mexico. The saddle notch on the bottom of the log is found only in the Chamal Valley, and the half-notch (false corner-timbering) occurs in Michoacán and Perote. The techniques are simple and non-distinctive; it seems impossible to trace the Mexican forms to specific origins for two reasons: (1) The double notch joint, the most complicated technique, is common throughout the European distribution of corner-timbering. (2) The Mexican forms may not follow introduced prototypes; they may be the crude copying of more sophisticated techniques introduced into each region and modified by the dispersal process of stimulus diffusion.

Folk terms applied to the log house and corner-timbering show considerable variation across Mexico, suggesting that independently derived vernacular terms, most descriptive of the particular trait, were applied to the log house in each region.

Three broad categories of log house types, based on floor plan and roof form, have been suggested: (1) The folk house represents the majority of the delineated types— the hipped-roof houses of the Mixteca Alta, Sierra de Mije, and Sierra de Puebla; the oreja-roof house and possibly the modified-hipped-roof house of the Sierra de Puebla; the apsidal-roof house of the Naranjos Valley; the gabled-roof house of Northeast Mexico; and possibly the hipped-roof houses of Michoacán and Perote. These dwellings represent the adaptation of an introduced construction technique,
corner-timbering, to the floor plan, dimensions, and roof forms of indigenous Mexican house types. (2) The introduced types, that arrived in Mexico with corner-timbered log construction, include the *paseo* house of the Chamal and Naranjos Valleys, the transverse-pen house of Northwest Mexico, and possibly the one-room, gabled-roof houses in the Chamal and Naranjos Valleys and Northwest Mexico and the hipped-roof houses of Michoacán and Perote, the former coming from the United States or representing a modified form of the popular house and the latter coming from central Europe or being the indigenous Tarascan house form. (3) The popular house—characterized by an oblong floor plan, gabled tile-roof, and deep, attached porch—occurs in parts of almost every region. It is the log version of the central Mexican town-house and, because of its urban associations, has apparently become the prestige house, gradually replacing the folk house types, with their attendant Indian associations, in each region.

**History of the Log House**

Corner-timbered log construction was apparently unknown in pre-Columbian Mexico. The earliest mentions of this building type date to the mid- and late eighteenth century in the Tarascan lands, the Perote area, and in some undetermined part of Central Mexico, suggesting a relatively early introduction of the technique.
Scholars have hypothesized the initial introduction of the log tradition into Mexico by one of three groups: (1) colonists from Spain, (2) missionary priests from central Europe, or (3) immigrants from Japan. Each of these provides a feasible route of introduction; a fourth, supported by circumstantial evidence as well as a feasible route, attributes the initial introduction of corner-timbering to German miners who settled at the mining center of Sultepec in 1536. It is quite conceivable that these Germans built corner-timbered log structures; Indian laborers acquired this construction technique and carried it to Michoacán and to parts of central Mexico.

Analysis of present distributions and types of corner-timbering techniques, log house forms, and vernacular terms suggest, with the one exception of Michoacán and Pote, that no connection exists between the log traditions in the major regions. The presence of corner-timbering in the other areas seems due to independent introductions of the technique into each region. The arrival of German miners in the early nineteenth century accounts for the presence of corner-timbering in the highlands of Oaxaca and the Sierra de Puebla. Americans from Texas and the United States southwest carried the log tradition into Northwest Mexico in the mid-nineteenth century; American colonists introduced the technique into Northeast Mexico in the late nineteenth and early twentieth centuries.
Certain facts seem to support the notion of an introduction of corner-timbering into the northern areas of Mexico by North Americans, but the question of origin of the log technique in the other areas of Mexico remains open. The documentary evidence necessary to test these hypotheses has yet to be unearthed.

Prospect for the Log House

What prospect looms for the Mexican log house in the future? The present regions of corner-timbered log construction represent remnant distributions of the tradition, and it appears that the log house will vanish from the Mexican landscape within the next few decades. Reportedly, few log houses have been built within the last generation, and many existing houses have been abandoned to the ravages of weather and time.

The rural-urban migration is contributing in large measure to the ultimate extinction of the log house. Within the past ten years, Mexican cities have increased in population by 75 to 80 percent and the suburbs of Mexico City by 100 to 330 percent, while the national increase, during the same period, has approximated only 38 percent (Ravelo: 4, 13). Much of the former increase resulted from rural people flocking to the jobs and amenities offered by city life. They established themselves in slum dwellings or makeshift structures of cardboard or tin, abandoning the rural culture
forever and losing the knowledge of folk building.

Prestige plays a major role in the demise of log construction; corner-timbering has come to represent an image of a backward, rural tradition. The log house is frequently regarded as a temporary structure to be occupied only until something better can be built. Non-folk house types advocated by the government, constructed of mam-posteria (stone masonry) or bloque (concrete block), plank-walled houses, and even pre-fabricated structures apparently have greater prestige value and are rapidly replacing the log house.

Another factor contributing to the decline of log construction is the series of federal laws prohibiting the cutting of trees for personal use without obtaining official permission from the forestry department and paying the necessary fees. Promulgated in the 1930's, these laws were intended to conserve the Mexican forests but, concurrently, have placed a great burden on the peasant by denying him his most available and widely used source of wood. Although the enforcement of these laws is uneven throughout the rural areas, and violations seem to occur with impunity, the use of timber for log construction involves a risk somewhat greater than its use for fire-wood or charcoal.

A fourth factor in the demise of the log house involves increasing specialization in Mexican society, even on the rural level. The knowledge of notching and log building,
once known by most men, has become the province of specialists, the carpinteros. The writer encountered only two informants throughout Mexico who reported that they themselves did the corner-timbering on their houses. Although the forestry regulations allow the restricted cutting of timber by individuals, specialists have come to handle this activity as well. Reliance on these specialists and the fact that logs must be purchased have contributed to the increasing cost of the log house and militate against its continued construction by rural folk.

A last factor, the most obvious, is the literal scarcity of timber. Vast areas of coniferous and hardwood forests in Mexico have been cut over during the centuries since Conquest by mining and lumbering companies exploiting the natural resources and by rural people in meeting the increasing demand for wood by a burgeoning population. In many areas, the basic materials for putting up a log house no longer exist.

All five factors have contributed to the decreasing popularity of the corner-timbered log house in Mexico. Abandoned houses dot the landscape, and the corner-timbering trait has begun to disappear from the folk culture. The log tradition, perhaps tracing its history in Mexico to the early sixteenth century, faces an ultimate extinction as a recognizable feature in the Mexican landscape.
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APPENDIX A

FOLK HOUSE ROOF TYPES

1. Michoacán

Beals and his associates have provided a detailed account of the construction of the corner-timbered troje; this section will briefly treat the construction of the roof (Plate 23a). After the placement of the loft flooring, pairs of rafters (tijeras or morillos) are situated at intervals along the cadenas (tops of the long walls), leaned toward one another, and fastened together. The pair of tijeras at each gable end is leaned toward the opposite gable side, and another rafter may be situated from the middle of each gable wall plate to the intersection of these gable rafter pairs (Plate 23a), the ridgepole (solera) being fitted into the junction of these end rafters. Additional rafters rest from the cadena to the solera; and purlins (fajillas), most frequently attached to the tijeras by means of nails rather than the wooden pegs formerly used, cross the rafters perpendicularly. Two layers of wooden shakes (tejamanil) rest on the purlins, being attached by two or three inch nails driven in part way on pine shakes, with wire being wrapped around each, and driven in all the way on fir shakes.
2. Oaxaca

a. Mixteca Alta

The construction of the hipped roof (Plates 23b-c) involves the placement of pairs of primary rafters (varas), leaned toward each other and fastened together, from the plates (soleras) of the long walls and a vara from the center of each gable wall plate to the confluence of the end pair of varas; the ridgepole (caballete) rests between the two intersections of varas. Two additional rafters extend one from each corner to the intersection of the gable vara and the caballete on that gable end. Four horizontally placed timbers, one on each wall side, are lashed to the varas to form a brace. The rafters, resting from the caballete to the solera on all sides, are crossed by purlins (cuilotes or trensados) laid parallel to the solera and nailed to the varas. Shakes (tejamanil) are nailed to the purlins.

b. Sierra de Mije

This hipped roof construction (Plate 23d) involves two groups of five rafters. One rafter of each group is embedded into the gable wall plate; two rafters, one into each long wall plate toward the middle of the wall; and two rafters, lashed one at each corner of the gable side. The five tijeras, leaned together, are joined by a long wooden peg called the tarugo (Plate 23e), which fits through the
holes drilled in the tops of all five rafters. Four horizontally placed timbers, one on each side and parallel to the plate, cross the tijeras about halfway up their length, being lashed to them and forming a brace. The short ridgepole (caballete) rests between the two intersections of tijeras. Rafters, situated between the ridgepole and the plate as well as from the horizontal braces to the gable wall, are crossed by purlins (morillitos). Pine needles and branches are laid over the few morillitos initially lashed to the tijeras near the plate and allowed to hang over the topmost purlin. The next morillito, placed so as to hold down this layer of pine branches, is joined to the tijera; and a second layer of pine branches is laid over the first with its ends overlapping the last laid purlin. This process continues (Plate 23f) until the thatching is laid up to the caballete, and a last layer of pine needles covers that; a log with protruding branches (culata), placed over the material and lashed to the caballete, holds this top-most layer of thatching down (Plate 10a).

3. East Mexico

a. Perote

The four-shedded techo de tijeras covering the casa de cajón does not involve the use of a ridgepole. Eight rafters (calejuales), divided into two groups of four and raised from each gable end, form the basic frame. One
Plate 23: Roof Construction

a. Troje, showing the roof framework. Arrow notes the position of the additional tijera that is set from the middle of the gable wall plate to the solera. (Cruz Gorda, Michoacán; February, 1970)

b. Mixtec hipped-roof construction. Arrows point out the three primary varas.

c. Mixtec hipped-roof construction. Arrows point out the bracing timbers.

d. Mije hipped-roof construction. Note the five main rafters that support the ridgepole. (West of Ayutla, Oaxaca; April, 1970)

e. Mije hipped-roof construction. Close-up of the tarugo that joins the primary tijeras. (West of Ayutla, Oaxaca; April, 1970)

f. Mije roof construction. Close-up of the thatching, viewed from the inside. Note how the morillitos are arranged to hold down the pine branches. (West of Ayutla, Oaxaca; April, 1970)
rafter rises from each corner, and the two others, one from each wall plate (solera) about one-third the length of the long side. A long wooden peg (tarugo or taruguillo) joins the four rafters. A fifth rafter, placed from the intersection of the calejuales to each gable wall plate, is sometimes joined with the other four rafters by the tarugo. Purlins (cintas or alfajillas), to which shakes (tejamanil) are nailed, cross the calejuales parallel to the solera and are usually nailed to them.

b. Sierra de Puebla

The construction of the hipped roof (Plate 24a-b), the modified gable roof, and the oreja roof involves essentially the same roof framework. Eight rafters (tijeras), raised four on each gable end, form the primary support for the roof frame. Two tijeras flank each corner of the plate, and the two pairs at each gable end are joined by a long wooden peg. Another rafter rests from the middle of the plate of the gable wall to the intersection of these four tijeras. Other rafters lean toward each other from the opposite long walls, each pair being joined by a peg; there is no ridgepole. The oreja roof involves two variations: the fifth rafter added to the framework of tijeras at each gable end is joined to the other four by the wooden peg; and the pairs of rafters support a ridgepole (cumbre) that extends beyond each gable end to form the oreja. On all the
roofs, purlins (cintas or jirones), attached by nails, rest parallel to the plate across the usually unhewn tijeras; the shakes or tiles are nailed to them.

The terminology for the various roof parts involves some variation. Around Zacualtipán, the terms tijera and cerco mean rafter, the tijera being hewn and the cerco sawed; and cinta and jirón refer to purlin, the former being hewn and the latter sawed. The cerco and jirón are normally associated with a lámina roof. South of Chignahuapan, cinta continues for purlin, but solvalcón is used for rafter.

North of Jacala, another roofing technique comes into prominence. Beams (vigas), laid front to back across the tops of the long walls and also perpendicularly across the gable walls, support timbers (soleras) laid across their outside ends and parallel to each wall. Six rafters (tijeras), divided into two groups, rest on the solera at an intersection with one of the vigas, one trio having two rafters on one long side and one on the other with the other trio offsetting this arrangement. Each three tijeras lean toward one another, being joined by a long peg, and support, with the aid of a tijera erected on the middle of the solera at each gable end, the ridgepole (cumbrera). Another set of rafters (culatas) leans from the gable ends of the front and back soleras to the intersection of the gable end tijera and cumbrera; four more culatas rest on each gable side solera, flanking the gable end tijera. Rafters (latas) rest from
the cumbre to the solera; purlins (huilotes), attached by nails, cross these and support the palma thatching material tied to the huilotes by separate strands and fibers (Plate 24c).

4. Naranjos Valley

The construction of the apsidal roof on the rectangular log pen involves the placement of timbers (vigas) front to back across the long walls; another timber (solero) rests in the center of and perpendicular to these and extends about three feet beyond the "gable" end walls. A pliable wood or bamboo connects the end of the solero to the two adjacent wall corners at the plate in a semi-lunate form (Plate 24d); termed the rueda, it thus gives the plate an apsidally shaped outline. Vertical beams (pies derechos or horcones) are half-notched and nailed to the solero; they in turn support the ridgepole (madre), which extends only to the house walls. Rafters (latas), laid from the madre to all points along the plate and the rueda, are crossed by the purlins (varillas), to which the palma roof thatching is attached. A well-laid roof involves the use of approximately 4000 to 5000 palm fronds. The stem of the palmate frond of the palma real is laid over and perpendicular to the varilla with the frond leaves down and away from the ridgepole. Two leaves, one on each side of the stem, are twisted, bent down, looped around the varilla, and brought back up over the
frond; they are pulled taut and tied in a knot. A second knot, put in the ends of these leaves, keeps the initial knot from coming undone. The roof is constructed by working up to the ridgepole, the successive layers of palm overlapping those below to the point that the roof is about twelve inches thick upon completion.
APPENDIX B

GABLE ROOF

The gable roof has two sub-types based on the form of construction. The first has a wide distribution including parts of Oaxaca, Michoacán, and East Mexico, and the second has a concentration centering on the area of the Sierra de Puebla adjacent to Zacatlán.

The first usually includes vertical planks closing the gable. Construction involves the placement of joists across the front and back walls; a timber rests perpendicularly over these between the gable walls (Plate 24e). Upon this cross-piece at one or more of the joists and at the plates of the gable walls are vertically set posts that in turn support the ridgepole. The rafters lean from the plates of the long walls to the ridgepole over which they are joined by a wooden peg; purlins rest across these and support the tiles which usually cover this roof.

Throughout all the areas, the joists are termed vigas, and the vertical posts supporting the ridgepole, pies derechos; but for most of the roof parts, the terms vary from one region to another. In Oaxaca, caballete refers to the ridgepole, while tijera means rafter, and tira or lata, purlin. In Perote, the ridgepole is cumbre, while
calehual or alfarda stands for rafter, and cinta or alfa-jilla, for purlin. One informant explained the differences in these terms, noting alfarda and alfajilla as Spanish terms and calehual and cinta as of Mexican origin. In the Sierra de Puebla, cumbrera again means ridgepole, while tijera refers to the rafter, and cinta, to the purlin.

The other subtype does not involve the use of vigas and pies derechos. A deeply half-notched timber (monacilla) (Plate 24f), nailed in a vertical position to each gable wall plate, supports the ridgepole (cumbrera) (Plate 24f). Rafters (tijeras) lean from the long wall plate to the ridgepole, being joined over the cumbrera by a wooden peg. Pairs of rafters at each corner support the horizontally laid logs (tisteras) that taper to form the gable (Plate 24f). Purlins (cintas) rest over the tijeras; and shakes (tejamanil), which most frequently cover the roof, are nailed to them.
Plate 24: Roof Construction

a. Construction of the Sierra de Puebla hipped roof. (North of Zacualtipán, Hidalgo; February, 1970)

b. Close-up of the hipped roof construction. Note the wooden pegs that join the four gable tijeras as well as the pairs of tijeras leaned up toward one another from the long sides. (North of Zacualtipán, Hidalgo; February, 1970)

c. Palma thatching is tied to the huilotes by separate fibers. (El Pinalito, Hidalgo; May, 1969)

d. The rueda, the rounded piece of wood pointed to by the arrows, connects the ends of the solero to the corners of the log pen so as to give the plate an apsidal form. (West of Ciudad Valles, San Luis Potosí; June, 1970)

e. Construction of one gable roof type. Note the pies derechos are situated inside the gables and the rafters are joined over the ridgepole. (East of Zaragosa, Puebla; April, 1970)

f. Construction of the other gable roof type. Note the monacilla that is raised on the plate of the gable wall and the tijeras that are joined above the cumbre. (West of Beristain, Puebla; May, 1970)
NOTES

1. The section on the roof construction of the Tarascan troje is drawn from Beals, et al. (13-14), supplemented by information gained from the author's field research in the area.
APPENDIX C

THE ORIGIN OF TEJAMANIL

One element frequently associated with the log house in Mexico is the roof of *tejamanil* (wooden shakes), the origin of which, in that country, remains in question. The Spanish *tejamanil* (spelled *taxamanil* in most colonial accounts) apparently comes from the Nahuatl term *tlaxamanillli*, a descriptive word derived from the combination of the Nahuatl *tlax*, meaning "thing," and a form of the Nahuatl verb *xamania*, meaning "to break or split" (Santamaría: 1022; Beals *et al.*: 34); the Spaniards adapted the Nahuatl word to their way of pronouncing things.

The sixteenth century *Crónica Mexicana* suggested the presence of wooden shakes in pre-Conquest times; it mentioned the arrival of the Aztecs in the Valley of Mexico: ". . . trocaban todo aquello por madera de morillos y tablillas . . . con todo eso comenzaron a hacer el templo . . . cubriendolo de madera . . . " (Alvarado Tezozomoc: 33). Díaz del Castillo (159) and Cortés (51) mentioned the sale of *tablas* and lumber in the market-place of Tlatelolco, but they said nothing of *tejamanil* or *tablitas*. Nevertheless, Sahagún (III, 145) described the Indian carpenter as dealing in wooden shakes: " . . . vende también . . . tablas,
tajamaniles, y tablazones." Whether the native carpenter knew *tejamanil* in pre-Columbian times or adopted it after Conquest is difficult to say; Sahagún wrote in 1570 and described an Indian culture modified by Spanish conquest. Carrasco attributes the introduction of shakes to the Spanish, noting the presence of wooden shakes on Basque shepherds' huts in the Pyrenees (Beals et al.: 34); but the reference dates to recent times and may even represent diffusion from Mexico to Spain. However the *Relación de Tasco* mentioned the use of shakes on the houses of the Spaniards: "... las casas de los españoles ... cubiertas de encina, roble, y la cobertura de encina de taxamanil ..." (Paso y Troncoso, 1905: VI, 281); and Alonso Ponce (II, 55) implied that something like a shake, referred to as *ripia*, was known in Spain during colonial times: "... taxamanil, que son unas tablas delgadas, toscas y por labrar, que parecen algo a las ripias de España." Whether *ripia* referred to a roofing material or was just a descriptive word remains in question. The Spaniards usually employed "beams and boards" (Kubler: I, 174), rather than light shakes, in wooden roofs.

If introduced from Europe, *tejamanil* apparently spread through central Mexico with rapidity. Wooden shakes provided the roofing material for the house of Diego de Ordaz in Mexico City as early as 1531 (Tasación y autos: 530). Pimental (237) mentioned the presence of *tejamanil*
in 1570 in Xiquilpa: "... estos naturales no tienen casas, si no son de tejamanil...." He (157) noted also the preparation of *tejamanil* in Tlalchilapa in the *comarca* of Toluca: "... viven estos naturales ... de vender ocote y maiz, y tejamaniles." Alonso Ponce (II, 55) described shakes in the Otomi poblito of San Martin near Malacatepec: "... estaban las casas, que no eran muchas, hechas todas de taxamanil...." The sixteenth century *Relaciones Geográficas* mentioned the presence of *tejamanil* in Teotenango (Paso y Troncoso, 1905: VII, 31), Temazcaltepec (Paso y Troncoso, 1905: VII, 27), and Taxco (Paso y Troncoso, 1905: VI, 281). Shakes were possibly used in Tepeaca (Paso y Troncoso, 1905: V, 41), Coatepec (Paso y Troncoso, 1905: VI, 63), and Chimahuacantoyac: "... cubiertas de palos, delgados ..." (Paso y Troncoso, 1905: VI, 78). The *Relación de Xocotlán* from 1584 gave a detailed description of the use of *tejamanil* (Paso y Troncoso, 1947: 54-55):

... en esta provincia no usan teja, mas en lugar della muchas casas cubren con ciertas tablillas del tamaño de las tejas en poco mas largas y casi del propio anchor, enpero son ilanas e gruesas de un dedo, las cuales clavan sobre el maderamiento de la casa, y danle suficiente corriente para que no rreparen en ellas el agua, llamanse en lengua mexicana Taxamaniles y dura su cobertura diez y doce anos, hazense de un cierto genero de pino que ay en la provincia de Mechuacán que hiendo muy facil y derecho, de donde las traen a esta provincia.

*Relaciones* from 1585 noted the use of *tejamanil* on houses in the mining centers of Sombrerete (Paso y Troncoso, 1947: 184) and Fresnillo (Paso y Troncoso, 1947: 323).
By the early seventeenth century at least, *tejamanil* had reached northeastward to Real del Monte: "... casas... cubiertas con tejamanil" (Descripción de las minas: 24), and Atotonilco: "... treinta casas bajas... cubiertas de tejamanil" (Descripción de las minas: 34), and Tlaulilpa (Descripción de las minas: 13). Apparently the use of shakes had become widespread in the capital as well, because a regulation promulgated in 1692 prohibited the roofing of houses with *tejamanil* (Rivera: 73). By the eighteenth century, the use of *tejamanil* was established in the Sierra de Huasteca: "Las casas... techadas con tablillas de tajamanil" (Relación de Guauchinango). As noted in the *Relación de Cerocahui*, the use of shakes had spread as well to the Sierra Madre Occidental in Chihuahua: "... Saca tajamanil que sirve para techos." The *Relación de Justlahuaca* suggested that *tejamanil* had also reached the Mixteca Alta by the late eighteenth century: "... sirven sus maderas principalmente para fabricar casas, tantos en las paredes, como en los techos..." (Paso y Troncoso, 1950: 39).

What is the origin of the wooden shake; was it introduced to or indigenous to Mexico? Shingles today have a wide distribution throughout Spain; and Vitruvius (39), writing in the first century B.C., noted that "in Gaul, Spain, Portugal, and Aquitane [houses were] roofed with oak shingles or thatched." This would suggest a long tradition
of shake roofs in Iberian Europe. However, if the Spaniards did know shingles, why did they adopt the Nahuatl term instead of using the Hispanic *ripia*. The Spaniards would logically adopt Nahuatl words for traits unfamiliar to them, like *chocolate* and *elote*, but they would presumably retain the Spanish word for elements familiar to them, such as *adobe*. Alvarado Tezozomoc (33) suggested the use of shakes in pre-Columbian times, a conclusion advocated as well by Orozco y Berra (1880: 320). Wooden shakes may have been adopted from the German miners at Sultepec, but this seems doubtful because the earliest mention of wooden shakes, in 1531, preceded the arrival of the Germans in Mexico by five years. The question of the origin of *tejamanil*, like that of the log house, remains in the realm of conjecture rather than of hard fact.
VITA

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John Winberry is presently a candidate for the degree of Doctor of Philosophy.