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# The Project for the Investigation and Conservation of the Feathered Serpent Temple, Teotihuacan, México

**Research Year:** 2007
**Culture:** Teotihuacan, Central Plateau
**Chronology:** Tzacualli and Miccaotli Phases, 1-200 CE
**Location:** México
**Site:** Teotihuacan Archaeological Zone

**Table of Contents**

**Abstract**

The Project for the Investigation and Conservation of the Feathered Serpent Temple, in Teotihuacan, Mexico, attempts to characterize the first occupation (1-200 CE) in the Ciudadela through the analysis of materials like obsidian, controlled by the Teotihuacan state. This study presents the INAA data and a source assignment for 50 obsidian samples, to identify trade relationships between this city and other regions.

**Resumen**

El Proyecto de Investigación y Conservación del Templo de La Serpiente Emplumada, en Teotihuacán, México, trata de caracterizar la primera ocupación de la ciudad en el complejo de La Ciudadela. Este estudio se desarrolla a través del análisis por INAA de la obsidiana, un recurso controlado por el Estado teotihuacano. Tiene por objetivo determinar las procedencias de los artefactos de obsidiana localizados en los conjuntos 1 y 2 Preciudadela para confirmar el dominio teotihuacano sobre los yacimientos locales, y las relaciones de intercambio establecidas con otras regiones.

**Introduction**

Teotihuacan, located 50 km. northeast of Mexico City (Figures 1 and 2), was between 300 and 500 CE the city with the greatest influence in the Mesoamerican world. However, we have little information about previous times (1-200 CE), before its political and economic apogee (250-450 CE), when Teotihuacan society grew and became powerful. During this time of important changes, the group in power developed an economy based on obsidian exploitation, the production of craft goods and the interchange of products with other settlements, expanding its prosperity to all the Altiplano Central.


**Figure 1. Map of México.**

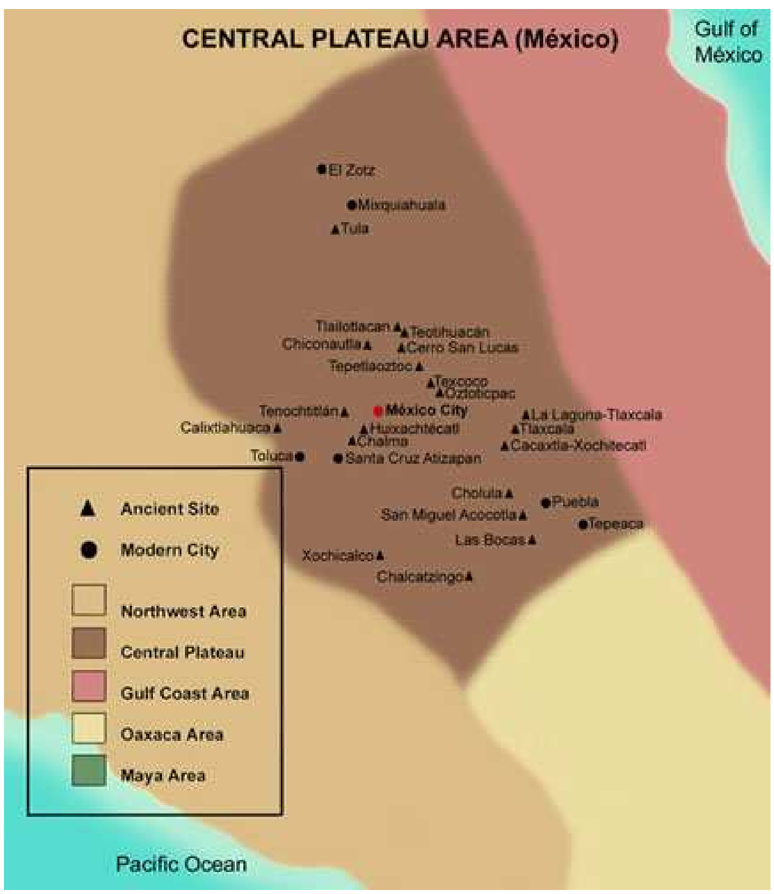


**Figure 2. Location of Teotihuacán, Central Plateau, México.**

The Project for the Investigation and Conservation of the Feathered Serpent Temple has the purpose of characterizing occupation in the first phases of Teotihuacan. In this case, we excavated several of the earliest compounds in the Ciudadela area (Figure 3), collecting a lot of material. One of the most significant materials for the comprehension of the Preciudadela occupation is obsidian, a mineral used for weapons, tools, ornaments and ritual objects. Its study is important for understanding the development of the group in power, the state and Teotihuacan society in general.

**Figure 3. View of Ciudadela in the old city of Teotihuacán.**

Selected according to the results of formal and functional materials analyses and also for the variation in obsidian colors, fifty samples were submitted to MURR (Missouri University Research Reactor Center) for neutron activation analysis (INAA), carried out by Dr. Michael Glascock, to identify major and trace elements which can help us to establish provisioning sources in the earlier phases. The samples were assigned analytical identification numbers GAZ001 through GAZ050. This report presents the data and source assignments for all 50 samples.

## Background

The studies by Spence (1967, 1981, 1983, *et al.* 1984, 1986, 1990), Charlton (1978, *et al*. 1978, 1983) and Spence and Charlton (1982), and others carried out by Pastrana and Sterpone (2005), on the Otumba (Mexico state) and Sierra de las Navajas (Hidalgo state) deposits, providing respectively grey and green obsidian, established obsidian exploitation and control by Teotihuacan people for both deposits. Due to the proximity and abundance of the material in those deposits, the majority of investigators believe that obsidian used in Teotihuacan came from both sources. This is probably the reason why there is so little analysis to identify other possible sources of supply.

Presently only one study exists on the identification of obsidian source provenance, for 111 samples from the Feathered Serpent Temple (Cabrera et *al.*, 1989), by neutron activation (Glascock and Neff, 1993). According to the results, the majority of obsidian materials from this context come from Otumba (79) and Sierra de las Navajas (21), but also from the Ucareo (1) (Michoacán), Zaragoza (2) and Paredón (5) (Puebla), and Fuentezuelas (1) (Querétaro) deposits. Two samples were not identified. The results show clearly a major use of obsidian from Otumba and Sierra de las Navajas compared to other identified sources, whose importation would not have had a significant impact on Teotihuacan economy. Thus we have to present some ideas which can explain the presence of obsidian from other deposits in the earliest phases.

## Objectives

The first objective of this study is to try to identify the geological origin of each of the 50 obsidian samples chosen and to learn the different sources of obsidian which arrived at Teotihuacan in the Tzacualli and Miccaotli phases (1-200 CE). In addition to identifying Otumba and Sierra de las Navajas as primary provisioning sources in the earliest phases, we will try to investigate the different kinds of relationships established with other regions.

In the case of green obsidian, whose geological provenance is recognized as Sierra de las Navajas, the study will try to define if the samples come from places recorded by Cobean (2002), or if they come from others beds in the Sierra. The results could have some implications for identifying different exploitation places in the Sierra de las Navajas (which were not destroyed by later exploitation or were different from the area recently investigated by Pastrana in the south of the Sierra ) (Pastrana 1998).

In order to confirm these results, it will be necessary in the future to take samples from others parts of the Sierra to obtain a large collection of geological reference samples. Then we can compare them with analyses carried out on Teotihuacan artefacts from different contexts in the city.

**Contexts of Samples**

Obsidian samples were obtained from prismatic blades, flakes, two scrapers and one bifacial located during the excavation of Preciudadela compounds 1 and 2 in the course of The Project for the Investigation and Conservation of the Feathered Serpent Temple (PICTSE), Teotihuacan, seasons 2002, 2003 and 2004 (Gazzola 2004, 2005a, 2007a), and then in The Preciudadela Project, season 2006 (Gazzola, 2005b, 2007b and c)[1].

The samples were selected for their colors, because they present diversity. It was designed to include all the colors and their varieties, like translucent green, golden green, and translucent grey to opaque grey.

The samples come from two layers: the first one is the construction fill of Preciudadela compounds 1 and 2 (Figure 4), situated on natural soil and also covered by the first floor of the different rooms in both compounds. The second one is in contact with this first floor, which is the oldest and is directly related to the occupation period knows as Preciudadela (Figure 5).

**Figure 4. View of Compound 1, Preciudadela, from which come the samples. The Ciudadela.**

[1] The Preciudadela Project developed in 2005, comes from PICTSE and its objective is to study only materials asociated with the Preciudadela occupation.

| INAA | Compound 2 | Artefact | Color |
|---|---|---|---|
| GAZ 001 | **Preciudadela construction fill** N1E1.13.36.12.VII. No 4520B. | prismatic blade | silver grey |
| GAZ 002 | | prismatic blade | opaque grey with semi-translucent part |
| GAZ 005 | N1E1.13.27.83.IX. No 3501. | prismatic blade | opaque grey |
| GAZ 004 | **Preciudadela Occupation** N1E1.13.36.5.VI. No 3032. | prismatic blade | opaque grey |
| GAZ 029 | N1E1.13.26.96.VI. No 3463. | prismatic blade | grey semi-translucent |
| GAZ 030 | N1E1.13.25.98.VI. No 3263. | prismatic blade | translucent grey |
| GAZ 031 | N1E1.13.26.96.VI. No 3463. | prismatic blade | dark grey |
| GAZ 032 | | prismatic blade | silver grey |
| GAZ 003 | **Construction fill Preciudadela/Ciudadela** N1E1.13.36.8.VII. No 4489. | prismatic blade | Opaque golden green |
| | **Compound 1** | | |
| GAZ 009 | **Preciudadela construction** N1E1.8.76.C39A.VII. No 766 | prismatic blade | translucent grey with grey lines |
| GAZ 010 | | prismatic blade | green |
| GAZ 011 | | prismatic blade | translucent grey |
| GAZ 006 | **Preciudadela Occupation** N1E1.8.76.C39A.VI. no 758. | prismatic blade | translucent green brown |
| GAZ 007 | N1E1.8.76.C40.VI. | prismatic blade | translucent grey |
| GAZ 008 | | prismatic blade | clear silver grey |
| GAZ 012 | N1E1.8.62.78.VIIA. No 1006 | prismatic blade | dark blue grey |
| GAZ 013 | | prismatic blade | translucent grey |
| GAZ 014 | | prismatic blade | clear silver grey |
| GAZ 015 | N1E1.8.63.75.VIA. No 995. | prismatic blade | Semi-translucent grey |
| GAZ 016 | N1E1.8.62.64,74.VIC. No 988. | prismatic blade | translucent grey with grey lines |
| GAZ 017 | N1E1.8.63.73.V. No 682, 698, 663. | prismatic blade | translucent grey with grey lines |
| GAZ 018 | | flake | dark silver grey |
| GAZ 019 | | prismatic blade | clear silver grey |
| GAZ 020 | | prismatic blade | translucent grey |
| GAZ 021 | N1E1.8.63.75.VIA. No 995. | prismatic blade | translucent grey |
| GAZ 022 | | prismatic blade | translucent grey |
| GAZ 023 | | prismatic blade | translucent grey with black points |
| GAZ 024 | N1E1.8.62.78.VIIE. No 1004. | prismatic blade | translucent grey |
| GAZ 025 | | prismatic blade | semi-translucent grey with grey lines |

| | | | |
|---|---|---|---|
| GAZ 026 | | prismatic blade | translucent grey with grey lines |
| GAZ 027 | | prismatic blade | translucent grey with grey lines |
| GAZ 028 | N1E1.8.42.53.XII. No 807. | flake | opaque grey |
| GAZ 033 | N1E1.8.74.32.VI. No 7361. | flake | red meca obsidian |
| GAZ 034 | N1E1.8.63.35.V. No 8489. | flake | dark grey |
| GAZ 035 | N1E1.pozo 53.2LL.V. No 7085. | macro-flake | semi-translucent grey |
| GAZ 036 | N1E1.8.65.57.VIIIB. No 168. | prismatic blade | grey |
| GAZ 037 | N1E1.8.73.44.VIII. No 887. | subprismatic blade | opaque blue grey |
| GAZ 038 | | prismatic blade | translucent grey |
| GAZ 039 | N1E1.8.73.44.IX. No 1011. | flake | blue silver grey |
| GAZ 040 | | subprismatic blade | opaque mate grey |
| GAZ 041 | | prismatic blade | translucent grey |
| GAZ 042 | N1E1.8.73.37.VII. No 6367. | prismatic blade | dark grey |
| GAZ 043 | | prismatic blade | semi-translucent grey |
| GAZ 044 | | prismatic blade | translucentgrey |
| GAZ 045 | | prismatic blade | translucent grey |
| GAZ 046 | N1E1.8.62.78,88.VIIA. No 914. | arrow | semi-translucent grey |
| GAZ 047 | N1E1.8.62.78,88.VIIE. No 1004. | scraper | semi-translucent grey |
| GAZ 048 | | preform of scraper | red meca obsidian |
| GAZ 049 | N1E1.8.73.44.VIII. No 890. | flake con cresta | semi-translucent grey |
| GAZ 050 | N1E1.8.42.65.VIII. No 598. | prismatic blade | grey |

**Figure 5. Location, kind of artefact and color of obsidian samples.**

**Neutron activation technique or INAA** (Instrumental Neutron Activation Analysis)
According to Tenorio,

> INAA is based on the detection of kinds of radioactivity produced in a sample when it is put in contact with thermal neutrons. (…) When a sample is bombarded by neutrons, a great variety of nuclear reactions occur. The thermal neutrons interact with the nuclei of the elements present, and produce nuclear reactions. The majority of stable isotopes capture thermal neutrons, and the capacity that a core has to capture a neutron is termed its “effective section”. Capturing the neutron, the core becomes an excited core, and one of the ways to lose that energy is through the emission of gamma radiation. (…). The detection and identification of this gamma radiation energy allows us to recognize the radioactive element and so use an additional parameter, which is the “half life”, a value characteristic of each radioisotope. We define this term as the time passed for an activity Ao/2 of the radioelement to be reduced by half, Ao/2. Half life values vary from microseconds to thousands of years. (…) To carry out the quantitative analysis we use the comparative method, which consists of irradiating a standard with elements of known concentration together with the sample which we want to analyze, to detect the gamma radiation emitted by the standard as well as the problem sample, in the same geometric conditions. In this way, the only parameters to be controlled by the calculations will be the values of the effective section, the neutron flux and the count time. (Tenorio, 2004:104, 106, author’s translation).

About short neutron activation, Glascock says that

> Abbreviated or short-irradiation neutron activation analysis of obsidian at MURR consists of a single irradiation for five seconds of a sample weighing about 100 mg encapsulated in a polyethylene vial using a thermal neutron flux of $8x10^{13}$ n $cm^{-2}$ $s^{-1}$. The short irradiation was followed a 25-minute decay and 12-minute count enabling measurement of seven short-lived elements (Al, Ba, Cl, Dy, K, Mn and Na) (Glascock, 2007, *et al.*, 1994).

## Results and interpretation of neutron activation analysis

The analysis by neutron activation allowed us to identify the sources as Otumba (33) (Mexico state), Sierra de Pachuca (or las Navajas)-1 (3) (Hidalgo), Paredón (12) and Zaragoza (1) (Puebla), and Ucareo (1) (Michoacán) for the fifty obsidian samples obtained (Figures 6 and 7).

| anid | Al | Ba | Cl | Dy | K | Mn | Na | source_name |
|---|---|---|---|---|---|---|---|---|
| GAZ001 | 68816 | 952 | 247 | 3.38 | 31872 | 393 | 30817 | Otumba |
| GAZ002 | 71879 | 854 | 279 | 3.36 | 31851 | 396 | 30338 | Otumba |
| GAZ003 | 58927 | 0 | 866 | 16.14 | 47722 | 1130 | 31561 | Sierra de Pachuca-1 |
| GAZ004 | 70162 | 850 | 277 | 2.96 | 37431 | 393 | 27210 | Otumba |
| GAZ005 | 75561 | 657 | 314 | 4.13 | 34589 | 621 | 32218 | Otumba (Apan subsource?) |
| GAZ006 | 58909 | 0 | 902 | 16.35 | 36498 | 1140 | 37680 | Sierra de Pachuca-1 |
| GAZ007 | 62841 | 54 | 640 | 7.96 | 37650 | 365 | 29172 | Paredon |
| GAZ008 | 64163 | 0 | 646 | 7.85 | 37361 | 365 | 29205 | Paredon |
| GAZ009 | 74678 | 794 | 324 | 3.60 | 33925 | 392 | 30063 | Otumba |
| GAZ010 | 57659 | 0 | 832 | 15.95 | 32644 | 1127 | 37500 | Sierra de Pachuca-1 |
| GAZ011 | 62354 | 103 | 638 | 8.11 | 38768 | 369 | 29693 | Paredon |
| GAZ012 | 67275 | 101 | 207 | 4.00 | 39938 | 173 | 27786 | Ucareo |
| GAZ013 | 78738 | 775 | 268 | 3.59 | 33537 | 407 | 31744 | Otumba |
| GAZ014 | 72880 | 870 | 282 | 4.01 | 33224 | 392 | 30114 | Otumba |
| GAZ015 | 76654 | 898 | 253 | 3.53 | 32265 | 395 | 30498 | Otumba |
| GAZ016 | 66623 | 87 | 625 | 7.92 | 35823 | 371 | 29780 | Paredon |
| GAZ017 | 73483 | 841 | 247 | 3.73 | 33776 | 396 | 29895 | Otumba |
| GAZ018 | 70646 | 826 | 222 | 2.71 | 32297 | 418 | 30598 | Otumba |
| GAZ019 | 75961 | 740 | 232 | 3.29 | 32762 | 392 | 30564 | Otumba |
| GAZ020 | 68725 | 835 | 233 | 3.39 | 34185 | 394 | 30485 | Otumba |
| GAZ021 | 65123 | 0 | 634 | 8.33 | 38290 | 367 | 29520 | Paredon |
| GAZ022 | 63501 | 85 | 651 | 8.85 | 41313 | 370 | 29807 | Paredon |
| GAZ023 | 68237 | 0 | 603 | 8.18 | 42524 | 372 | 30141 | Paredon |
| GAZ024 | 68980 | 0 | 593 | 8.75 | 42770 | 374 | 30400 | Paredon |
| GAZ025 | 72216 | 758 | 231 | 3.06 | 33280 | 401 | 31004 | Otumba |
| GAZ026 | 69901 | 797 | 246 | 3.08 | 33957 | 393 | 30550 | Otumba |
| GAZ027 | 68344 | 835 | 257 | 3.44 | 32465 | 395 | 30879 | Otumba |
| GAZ028 | 72541 | 777 | 266 | 3.49 | 32812 | 405 | 30792 | Otumba |
| GAZ029 | 72938 | 857 | 248 | 3.21 | 34793 | 403 | 31124 | Otumba |
| GAZ030 | 68393 | 0 | 650 | 8.44 | 40836 | 373 | 29955 | Paredon |
| GAZ031 | 72418 | 882 | 223 | 3.11 | 33995 | 400 | 31354 | Otumba |
| GAZ032 | 78230 | 769 | 280 | 3.10 | 32520 | 405 | 31624 | Otumba |
| GAZ033 | 71051 | 490 | 187 | 4.28 | 34369 | 618 | 32247 | Otumba (Apan subsource?) |
| GAZ034 | 70467 | 838 | 252 | 3.94 | 34829 | 398 | 30379 | Otumba |
| GAZ035 | 72851 | 832 | 269 | 2.96 | 34088 | 394 | 30634 | Otumba |
| GAZ036 | 75676 | 711 | 273 | 3.82 | 35677 | 630 | 32471 | Otumba (Apan subsource?) |
| GAZ037 | 66572 | 466 | 324 | 4.65 | 37236 | 249 | 29439 | Zaragoza |
| GAZ038 | 63208 | 107 | 618 | 8.36 | 42117 | 365 | 29616 | Paredon |
| GAZ039 | 68891 | 758 | 187 | 2.99 | 31961 | 414 | 30481 | Otumba |
| GAZ040 | 68591 | 791 | 252 | 3.54 | 34108 | 398 | 29906 | Otumba |
| GAZ041 | 66458 | 99 | 622 | 8.31 | 38719 | 369 | 29790 | Paredon |
| GAZ042 | 76292 | 869 | 266 | 3.09 | 35230 | 408 | 31376 | Otumba |
| GAZ043 | 72997 | 833 | 325 | 3.21 | 34270 | 383 | 30198 | Otumba |
| GAZ044 | 70464 | 881 | 285 | 2.99 | 33283 | 388 | 30554 | Otumba |
| GAZ045 | 67258 | 0 | 721 | 7.97 | 40910 | 360 | 29355 | Paredon |
| GAZ046 | 69537 | 774 | 311 | 3.27 | 34313 | 402 | 30931 | Otumba |
| GAZ047 | 75986 | 853 | 322 | 3.86 | 35814 | 396 | 30217 | Otumba |
| GAZ048 | 73721 | 695 | 262 | 3.54 | 39196 | 384 | 29405 | Otumba |
| GAZ049 | 69161 | 779 | 294 | 2.77 | 37252 | 386 | 30340 | Otumba |
| GAZ050 | 77980 | 861 | 279 | 3.07 | 33482 | 388 | 30595 | Otumba |

**Figure 6. Concentration of elements (ppm) in obsidian samples (Glascock 2007).**

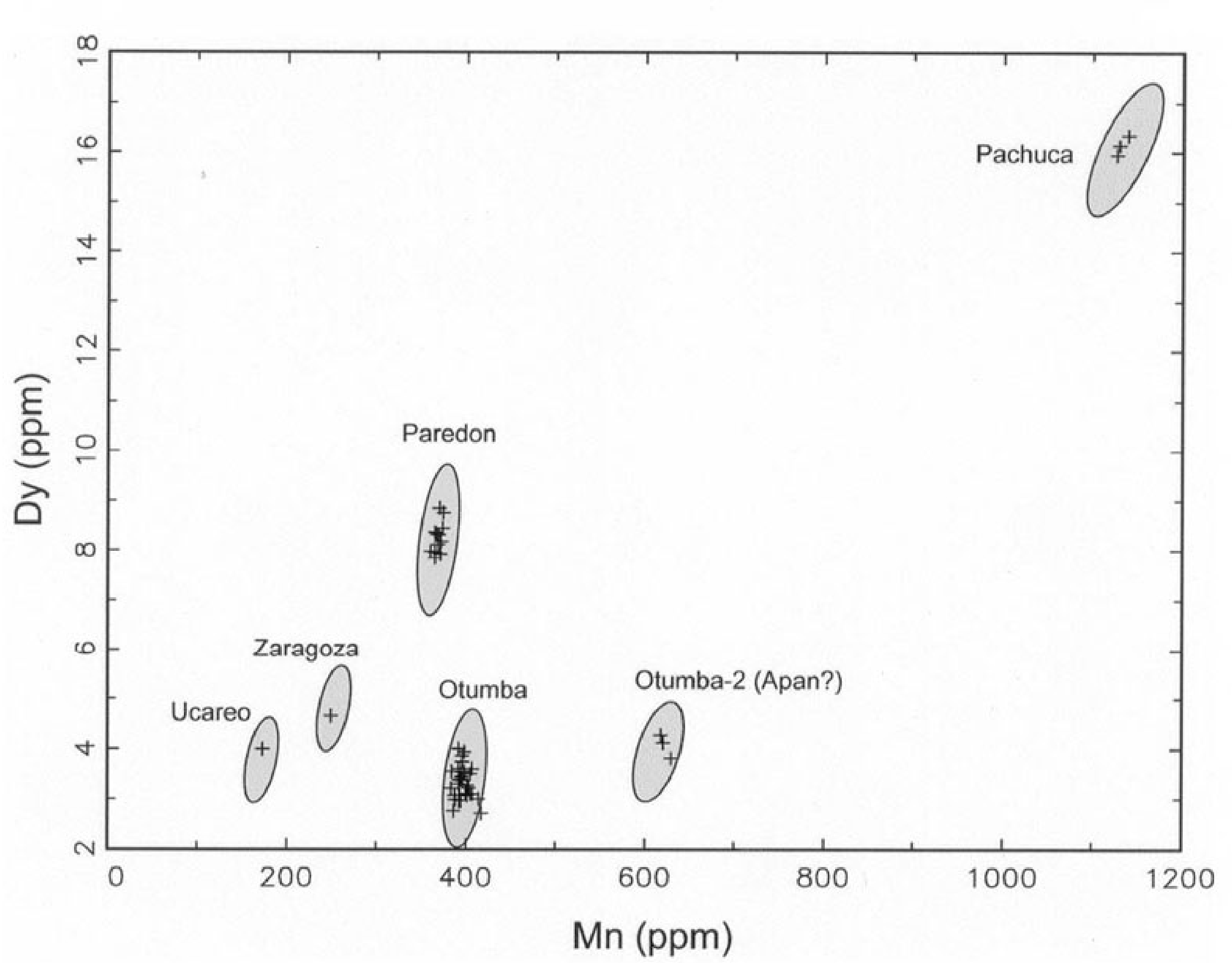


**Figure 7. Identification of obsidian deposits with Dy and Mn elements (Glascock 2007).**

The obsidian samples from Otumba are grey with different tonalities like clear or dark silver, opaque with semi-translucent parts, opaque, blue silver, semi-translucent, translucent, translucent with grey lines, and red (Figure 8). Despite what Charlton (1978) says, it is impossible using the variations of grey color to make a macroscopic identification of obsidian from Otumba, because of the presence of similar colors in other deposits, for example Paredón. In this same deposit, Glascock mentions Apan as a subsource, determined by the analysis of Charlton's samples (Glascock, personal comunication 2007). However after a discussion with Charlton and Glascock, it seems that the provenance has not been clearly identified, even though following them the samples seem chemically to be Otumba or Malpaís. According to Cobean Malpaís is a different deposit located between 10 and 12 km east of Otumba (2002: 60). Lacking a precise analysis, we considered them to be of an unidentified source. The obsidians from "Apan" are opaque grey and meca (Figure 9).

**Figure 8. Colors of obsidian from Otumba (photo by Miguel Morales).**

**Figure 9. Colors of obsidian from "Apan" (photo by Miguel Morales).**

With respect to the colors of obsidian from the Sierra de las Navajas, they are opaque golden green and translucent brown green (Figure 10), while those of Paredón are translucent grey, translucent grey with grey lines, with black points or clear silver (Figure 11); we can confuse some of these colors with those from Otumba. At Ucareo, the obsidian is dark blue grey (Figure 12) and at Zaragoza, opaque blue grey (Figure 13).

**Figure 10. Colors of obsidian from Sierra de Pachuca-1 (photo by Miguel Morales).**

So we can conclude that the observation of colors is very subjective and not adequate for a macroscopic identification of obsidian geological origin. In each case it is necessary to confirm the provenances by analitical techniques like INAA or PIXE.

Most of samples analyzed are prismatic blades, which have been associated with all the deposits identified. The prismatic blade was probably the object most used and the artefact most exchanged, both locally and regionally. As we expected, we found that a major variety of artefacts, like flakes, projectile points and scrapers, comes from the Otumba deposit. The proximity of this source was without doubt the reason why the Teotihuacan people brought in this obsidian as raw material to then be worked in the city workshops, as well as probably bringing in artefacts created in these same deposits.

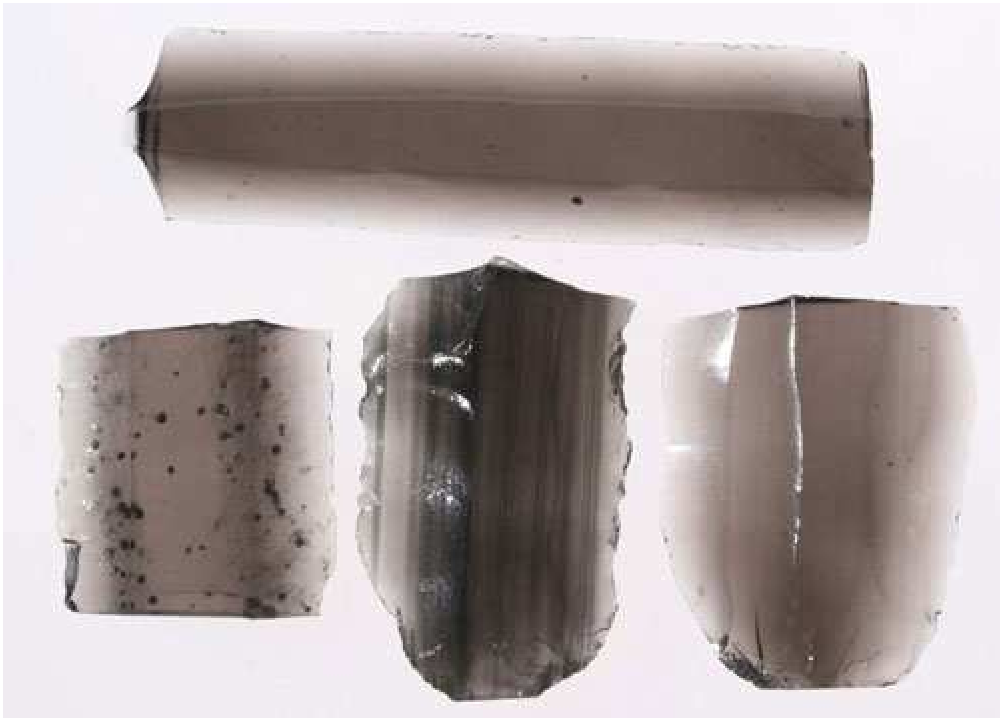

**Figure 11. Colors of obsidian from Paredón (photo by Miguel Morales).**

The Otumba deposit near the Teotihuacan city was according to Spence (1981), the first one to be exploited largely by Teotihuacanos. The grey obsidian found in Compound 1 (in association with the first occupation phases in Tzacualli (1-150 CE) and Miccaotli (150-200 CE)) represents 65% of the obsidian materials classified until now, whereas 35% was green obsidian from the Sierra de las Navajas. This situation confirms a less intensive exploitation of these latter deposits by Teotihuacanos. According to Spence, the extraction of green obsidian would have intensified beginning in the Early Tlamimilolpa phase, when the state controlled this resource. The obsidian workshops in the Sierra de las Navajas that have been recently excavated (Pastrana, 2006) were part of the state strategy for the control of production and distribution. However, we don't know the characteristics of this exploitation in the early phases, in Cuanalan, 500-200 BCE (Manzanilla, 1985), and Patlachique times, 200 BCE-0 (Spence, 1981).

With the excavations of compounds 1 and 2, built and occupied in Tzacualli and Miccaotli times, we found a significant number of green obsidian artefacts (at present 35% of analized materials from Compound 1), that demonstrate exploitation of the Sierra de las Navajas deposits. Nevertheless, the quantity of green obsidian materials doesn't surpass the quantity of grey used at that time.

Moreover, during the excavations by PICTSE and the Preciudadela Project, we found grey obsidian fragments which indicate that it was brought to the city and then worked, although we didn’t identify green obsidian as raw material in this context. This could suggest that by this time Teotihuacanos were manufacturing objects in this obsidian in some workshops at the Sierra de las Navajas, places which would have been in continuous use until the Metepec phase (550-650 CE).

**Figure 12. Color of obsidian from Ucareo (photo by Miguel Morales).**

The samples of green obsidian come from the Sierra de Pachuca-1, which seems to indicate a specific location of raw material extraction in the source region. Cobean (2002) took samples from two other areas, Sierra de Pachuca-2 and -3, which correspond to other parts of the region, but they were not identified in the analyzed samples.

**Figure 13. Color of obsidian from Zaragoza (photo by Miguel Morales).**

We know little about the exploitation of the Paredón deposit in Puebla, which had been used since the Early Formative (Charlton *et al.*, 1978). Charlton mentions the presence of Paredón obsidian in the Teotihuacan site of Tepeapulco, located near the deposit, which could imply control of this source by Teotihuacanos. The obsidian of Paredón was used to some extent by the people of Compound 1, but the quantity from Zaragoza and Ucareo isn't enough to establish what kind of relationship existed between these regions and the city at this time.

## Conclusion

The majority of obsidian samples collected in Preciudadela compounds 1 and 2, and analyzed by INAA, comes from Otumba (33), and from the Sierra de las Navajas (3)[2] for the greens. These are the main sources, the first located 20 km northeast of the old city of Teotihuacan and the second 80 km northeast, exploited and controlled by Teotihuacanos since early times (Spence, 1981; Pastrana y Sterpone, 2005) (Figure 14).

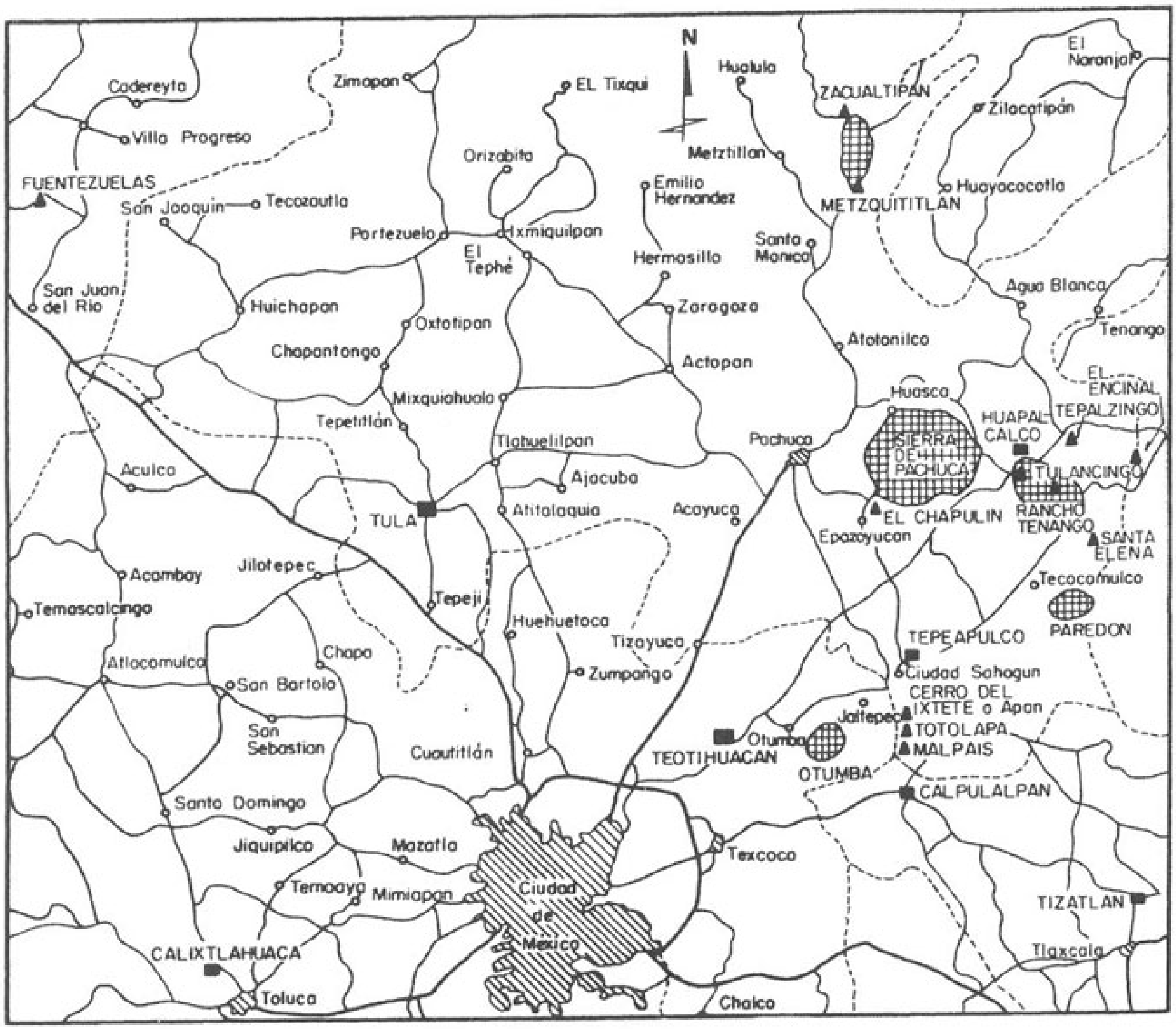


**Figure 14. Location of obsidian deposits identified (Cobean, 2002).**

[2] We woul like to identify several places of extraction in the Sierra de las Navajas through the analysis of selected samples of green obsidian. The green obsidian was 35% of total material.

In general, we can conclude that the Teotihuacanos in early times used obsidian from local deposits.

Following the analysis carried out by INAA on samples GAZ 007, 008, 011, 016, 021, 022, 023, 024, 030, 038, 041 and 045, and their comparison with the neutron activation standard, all come from the Paredón deposit in Puebla. According to these statistics, Paredón would probably have been an important provisioning source for the city in early times. Charlton mentions the exploitation of this source even in the Early Formative (1978).

In spite of the large obsidian quantities found from Otumba and Sierra de las Navajas, we also discovered obsidians from distant deposits in the same contexts. The sample GAZ 012 comes from Ucareo, Michoacán and GAZ 037 from Zaragoza, Puebla (Figure 15).


**Figure 15. Corrected map from the original (Cobean, 2002), location of obsidian deposits mentioned in the text 6. Ucareo, Michoacán. Fuentezuelas, Querétaro. 12. Sierra de Pachuca, Hidalgo. 21. Malpaís, Hidalgo. 22. Otumba, edo de México. 23. Paredón, Puebla. Zaragoza, Puebla. 26. Guadalupe Victoria, Puebla.**

Although in these cases the presence of ceramics from the Gulf Coast and Michoacán in several parts of the city demonstrate exchange relations between these regions, in the case of the obsidian it is difficult to determine the reason for its presence in Teotihuacan.

**Acknowledgments**

The analyses were carried out thanks to FAMSI grant #07093. I thank the assessors of this study, Drs. Robert Cobean and Alejandro Pastrana from the Direction of Archaeological Studies, INAH, Mexico, and Michael Spence from the University of Western Ontario, Canada. I also thank Dr. Michael Glascock from the University of Missouri, US, for INAA analysis and his report about obsidian materials from the Feathered Serpent Temple, and Dr. Dan Healan, who helped me to identify some samples from Ucareo.

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