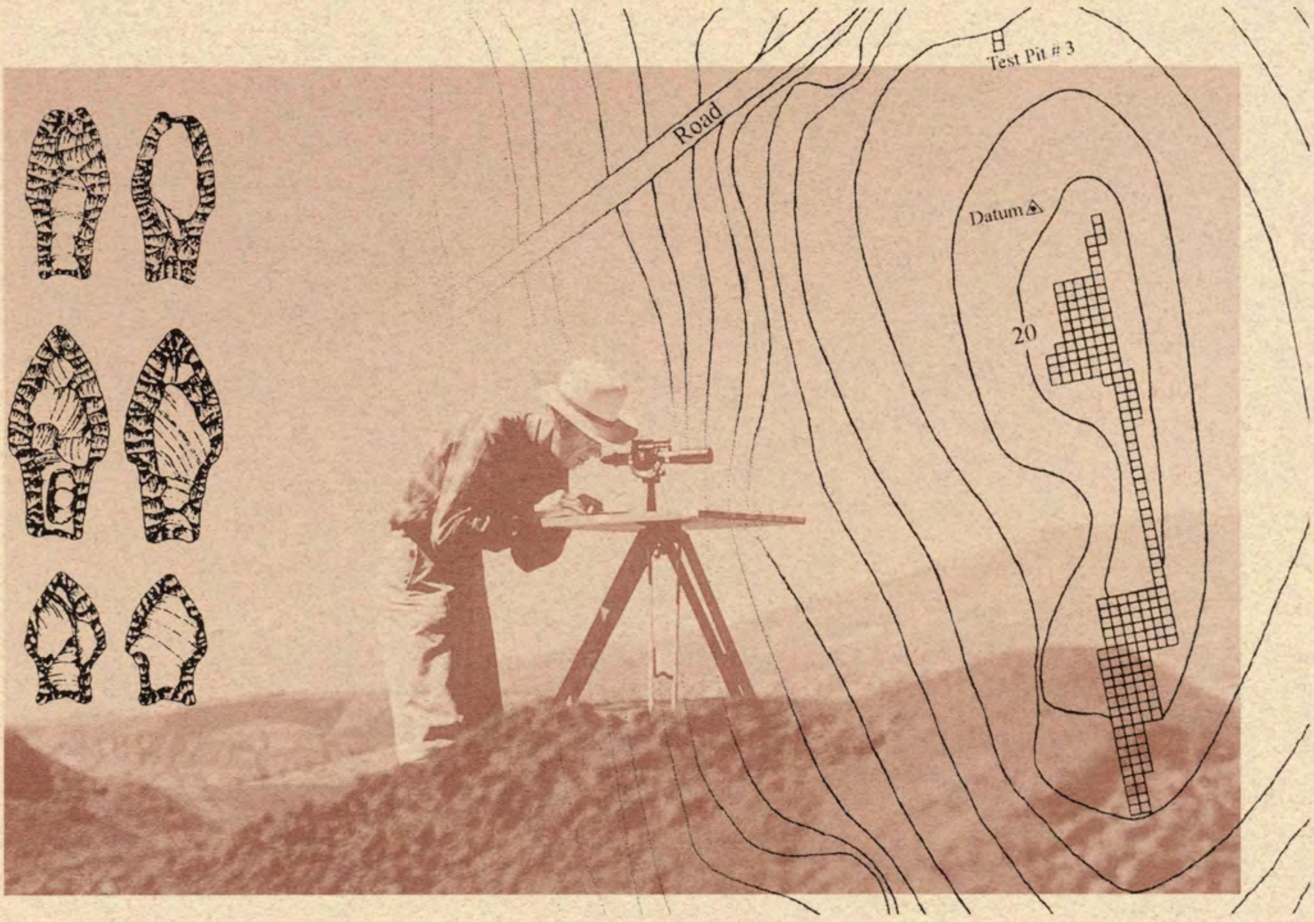
Archaeological Investigation at the Site of
El Inga, Ecuador



Robert E. Bell

University of Oklahoma
Sam Noble Oklahoma Museum of Natural History
R.E. Bell Monographs in Anthropology: Number 1
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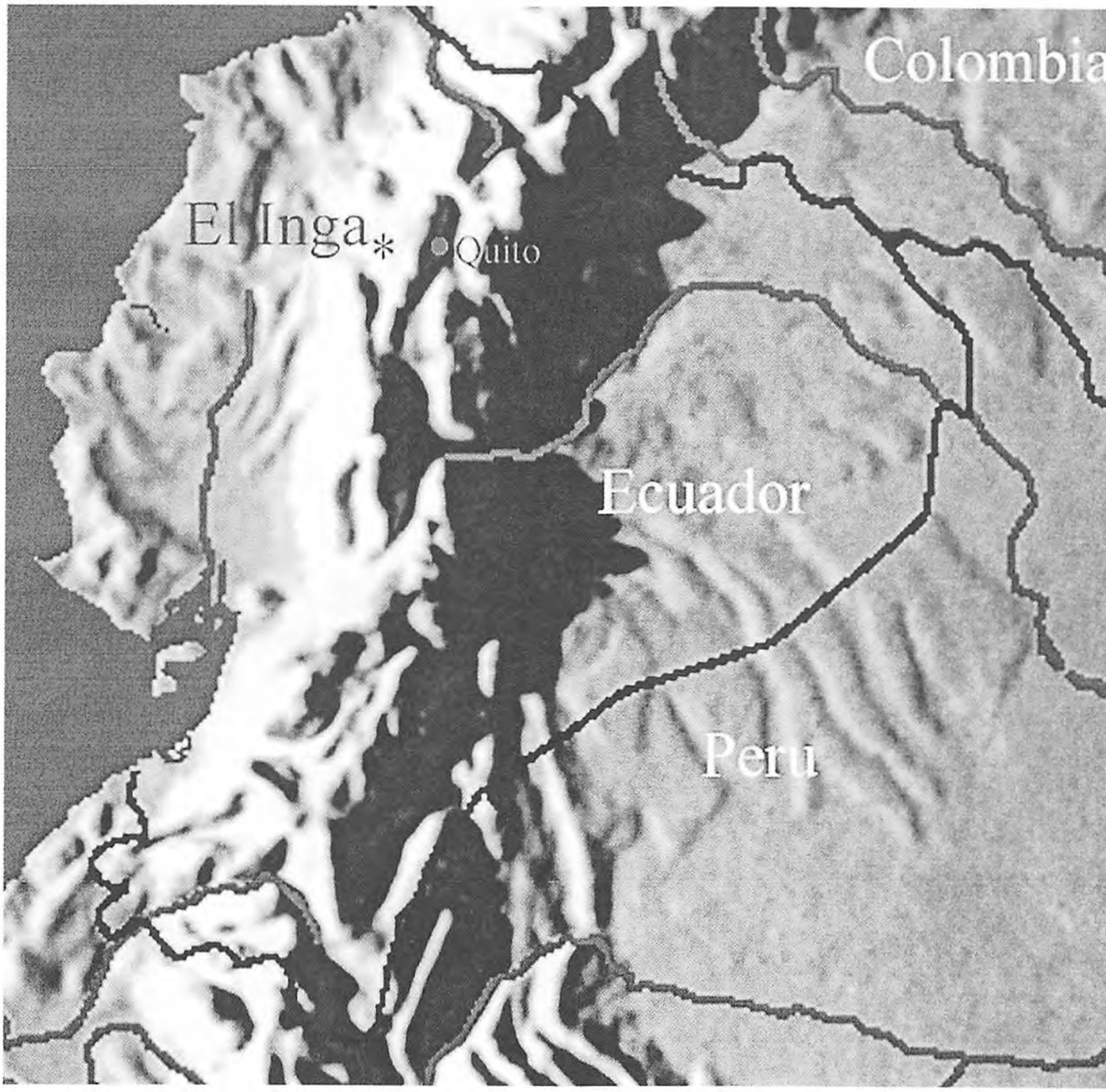

Location of El Inga archaeological site in Ecuador

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PREFACE

Dr. Robert E. Bell's report on the El Inga Site in Ecuador inaugurates a series of anthropology monographs sponsored by the Sam Noble Oklahoma Museum of Natural History. Funded by anonymous benefactors, the R. E. Bell Monographs in Anthropology will be an outlet for students and staff at the Museum studying archaeology and ethnology. These monographs will be published as manuscripts become available from research conducted at the Museum or on collections for which the Museum serves as a steward for care and preservation.

We are especially pleased to make the El Inga report the first issue in the *R. E. Bell Monographs in Anthropology*. This study of a Paleoindian site in highlands of Ecuador was never published in North America. Originally submitted in 1964 as a final report to the National Science Foundation, this study was published in 1965 in Spanish and English by the Casa de la Cultura Ecuatoriana of Quito, Ecuador. Unfortunately, few copies of this publication ever reached North America. Although we have reformatted it somewhat, this latest edition is the text that was submitted to the National Science Foundation in 1964. Dr. Bell has kindly reviewed and edited this version, and he provided the slides from which the several pages of plates were produced. We thank him for his support and interest. We also thank Joan Harrel for scanning the original text so that we could format it and integrate the illustrations at appropriate places. In addition, we express our appreciation to Dr. Gary D. Schnell, Curator of Birds and Associate Director for Collections and Research at the Sam Noble Oklahoma Museum of Natural History, and to David L. Certain, Graduate Research Assistant, for access to equipment used in producing this edition.

Naming this monograph series after Dr. Bell is merited. From 1947 to 1980, he taught anthropology at the University of Oklahoma and served as curator of anthropology/archaeology at the University's Stovall Museum. Trained in dendrochronology, Dr. Bell maintained a strong interest in thorough analyses of all materials recovered during archaeological excavations. During his tenure at the University of Oklahoma, he inspired dozens of students to seek answers in pottery, chipped stone tools, chipped stone debris, animal bones, and the dirt and habitation features exposed at all kinds of prehistoric sites. These students had ample opportunities to analyze collections for research papers and theses because of Dr. Bell's knowledge of the vast archaeological collections for which he was responsible at the Stovall Museum. There, in the long rectangular room with extensive layout space on tables and counter tops, students spent countless hours comparing, measuring, photographing, and documenting their findings. Dr. Bell was usually there on Tuesdays, Thursdays, and Saturday mornings, and he was always willing to listen, question, and advise those working on research projects. As former student Jack Hofman has remarked, Dr. Bell's pipe smoke served as a catalyst for serious work.

Through the years, Dr. Bell was recognized for his contributions to understanding and preserving the prehistory of Caddoan speaking people, those who once inhabited eastern Oklahoma, as well as Plains villagers who lived in central and western Oklahoma, including the Panhandle. Less well known is Dr. Bell's pivotal role in studying ancient hunters and gatherers in the highlands of South America. He worked mainly in the mountains of Ecuador, where he conducted surveys and excavations to find materials left by groups frequenting those settings soon after the last ice age. Some of this effort was stimulated by his 1961 excavations at the El Inga site.

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INTRODUCTION

The archaeological site herein designated by the name of El Inga was brought to the attention of Robert E. Bell by Mr. A. Allen Graffham of Ardmore, Oklahoma. While employed as a geologist in Ecuador, Mr. Graffham followed his archaeological interest as an amateur, and he made surface collections at the site during the early months of 1956. The discovery of projectile points, particularly specimens exhibiting basal fluting, stimulated his interest, and several visits were made to the site for collecting surface materials. Graffham's previous interest in Paleo-Indian remains and his experience with early man materials found in Kansas and Nebraska in the Central Plains led him to believe that the site was an important discovery. Consequently, upon his return to the United States, he brought his collection to Robert E. Bell at the University of Oklahoma for inspection. Bell also recognized the importance of the site collections and presented a paper reporting the finds at the annual meeting of the Society for American Archaeology at Salt Lake City, Utah on May 1, 1959. Several persons in attendance expressed enthusiastic interest, and Dr. Marie Wormington of the Denver Museum of Natural History and Dr. Joe Ben Wheat of the University of Colorado urged that further investigation be initiated as soon as possible. To make the data generally available, Bell (1960) prepared an illustrated note for *Facts and Comments of American Antiquity* based upon the best specimens in the Graffham collection.

In the fall of 1959, Dr. William J. Mayer-Oakes joined the University of Oklahoma staff as Director of the Stovall Museum, and upon invitation from Bell a joint effort was made to obtain financial support for a preliminary study of the site. Funds for this purpose were made available by the Oklahoma Frontiers of Science Foundation, the Alumni Foundation, and the Faculty Research Committee of the University of Oklahoma; consequently, the period from January 23 to February 7, 1960 was spent in a pilot investigation of the El Inga locality. In this preliminary study it was hoped to achieve several things: (1) to locate the actual site from which Graffham had collected his specimens; (2) to make additional surface collections from the site; (3) to conduct simple test excavations to establish whether or not further work would be desirable; (4) to briefly examine the surrounding area to see if other sites were present; and (5) to establish contact with Ecuadorian officials and persons interested or concerned with the archaeology of the region.

All of these goals were accomplished in the brief time available. This was possible because of the genuine interest and wholehearted cooperation of individuals living in Quito, acting either in an official capacity or because of their personal interest. Mr. Jerry James, Cultural Officer of the American Embassy staff, and Matilda de Ortega, member of the Casa de la Cultura staff, were extremely helpful in introducing the writer to officials and persons interested in Ecuadorian prehistory. Sr. Julio Endara, President of the Casa de la Cultura authorized our fieldwork at the site and appointed Maria Angelica Carluci de Santiana as the representative of the Casa in the field activity. Dr. Antonio Santiana, Director of the Museo Etnografico, Universidad Central, and Maria, his wife, had been studying the chipped-stone industries of Ecuador, and a report was then in press (Carluci de Santiana 1960a). Sr. Carlos Manual Larrea, Vice President of the Casa de la Cultura, Ecuadorian scholar and author, permitted the examination of his personal collection and called attention to obsidian artifacts he had found near Tumbaco many years previously. Jan Schreuder and his wife accompanied the field party and helped collect surface specimens. Mr. George E. Richardson of the Inter-American Geodetic Survey loaned surveying equipment and helped in obtaining transportation and maps of the region. All of these individuals, as well as others not mentioned, helped in numerous ways and offered encouragement in this study.

With Graffham's directions, the site was located without difficulty and extensive surface collections of both obsidian and basalt artifacts as well as chip debris were made. Two 5'-square test pits were dug in different sections of the site, and the depth of occupational debris was established. Two nearby additional sites, Lozon and Ruvia Cocha, were located, and surface specimens were collected. With permission of the Casa de la Cultura, all of the materials collected were packed and shipped to the University of Oklahoma for study. A report upon the 1960 collections is being prepared by William J. Mayer-Oakes as a separate paper.

As one result of the 1960 fieldwork, it was evident that enough of the site remained to merit excavation, and plans were made to obtain the necessary financial support. During this time, preliminary notes reporting the additional information were published (Mayer-Oakes and Bell, 1960a, 1960b, 1960c).

In December 1960, a grant was obtained from the National Science Foundation of Washington, D.C., to carry out the excavations at El Inga, and arrangements were made to conduct the fieldwork during the months of June, July and August of 1961. Since Mayer-Oakes had a commitment for fieldwork in Canada, the excavations at El Inga were directed by Bell. Mr. James A. Neely, a graduate student from the University of Arizona Department of Anthropology, served as assistant director and field supervisor.

Bell and his family arrived in Quito on June 6, 1961, for a period of approximately three months during which time the excavations at El Inga were conducted. Preliminary preparations were necessary and included obtaining permission from the Casa de la Cultura to conduct the excavations, the purchase of certain supplies and equipment, procurement of a vehicle for transportation, employment of workmen for a field crew, etc. In all of these matters, Sr. Carlos Manuel Larrea, Dr. Antonio Santiana and his wife, Maria, were extremely helpful and graciously gave their time and attentions to our requirements. Sr. Benjamin Carrion, President of the Casa de la Cultura and Sr. Larrea, Vice President of the same institution, provided official authorization for the excavations, and Mrs. Santiana was appointed as representative of the Casa to observe the excavations. Mr. Harold G. Conger of the Servicio Cooperativo Interamericano de Salud Publica provided the loan of a vehicle for the daily transportation of personnel and equipment from Quito to the site. Dr. Pedro Leopoldo Nunez, owner of the land upon which the site is located, sanctioned the excavations and made a special trip to explain the mission to his tenent farmers living near the site. In addition, several other persons contributed to the success of the fieldwork in one way or another. Mr. Max Grossman, the Cultural Affairs Officer of the American Embassy, and his wife, Manya, helped in solving local problems as they arose and maintained a keen interest in the activities throughout the season. Dr. Isadoro Kaplan, Quito physician, joined occasional field trips and supplied additional background information about the site of El Inga.

Acknowledgment and appreciation is also expressed to the following individuals: Dr. Gerardo and Alicia Reichel-Dolmatoff, Mr. and Mrs. Hugo Deller, Sr. Cesar Vazquez Fuller, Mr. Herbert Hunter, Dr. Paulo de Carvalho Neto, Mr. Joseph L. Ramsey, Padre Pedro Porras Sr. Jorge A. Ribadeneira, and Mr. Rolf Blomberg.

During the intervening period from the 1960 season's reconnaissance and the 1961 excavations, Dr. Antonio Santiana and his wife, Maria Angelica Carluci, continued their research on the chipped-stone industries of Ecuador and had made extensive surface collections from a number of sites (Carluci de Santiana, 1960b, 1961). Their search had located additional sites in the vicinity of El Inga as well as close to Quito and Alangasi. Accompanied by the Santianas, field trips were made to a number of these sites and additional surface specimens were collected at that time. The Alangasi mastodon discovery locality reported by Uhle (1928) and the site of Urcu Huaico in the Alangasi area were visited. The sites of Lozon, Santa Lucia, San Cayetaino, and San Juan, all within the general region of El Inga were also investigated. In addition, Bell and Neely collected surface materials from several other sites: Reis Chupa, Itul Cachi, Ruvia Cocha #1, Ruvia Cocha #2, Papabamba, and Oyambaro (Fig. 1). The Santiana's have a large collection of artifacts from most of these sites, as well as from others which were not visited, and these are being studied by Mrs. Santiana (Carluci de Santiana, 1963). She is preparing a report upon these materials for presentation as a dissertation for the Ph.D. degree at the University of Buenos Aires. In view of the importance of her work, the author provided the labor and equipment for minor test excavations at two of the above sites: Santa Lucia and San Cayetaino. The test excavations were supervised by Mrs. Santiana and the results of the work are not included herein, but will supplement her research and will be included in her report on the region.

From the information already collected by the Santianas and our own limited reconnaissance, it is quite clear that there are a number of sites in the region between Tumbaco and Alangasi containing obsidian and basalt tools which represent a lengthy pre-ceramic occupation.

EL INGA SITE LOCATION AND DESCRIPTION

The site of El Inga is located in the province of Pichincha, Ecuador, approximately 22 km east, by road, from Quito. More specifically, it is located 8 km southeast from Tumbaco on the west side of Rio Inga which provides its name for the site (Fig. 1). The country road from Tumbaco to the Hacienda of San Juan passes along the eastern edge of the site where it begins a winding descent to cross the Rio Inga Canyon bridge. Immediately to the south of the site and within view of the bridge, the quebrada Rumiloma empties into the Rio Inga from the west. The Rio Inga flows northward to join the Rio Chiche just east of Tumbaco, where it continues northward to ultimately

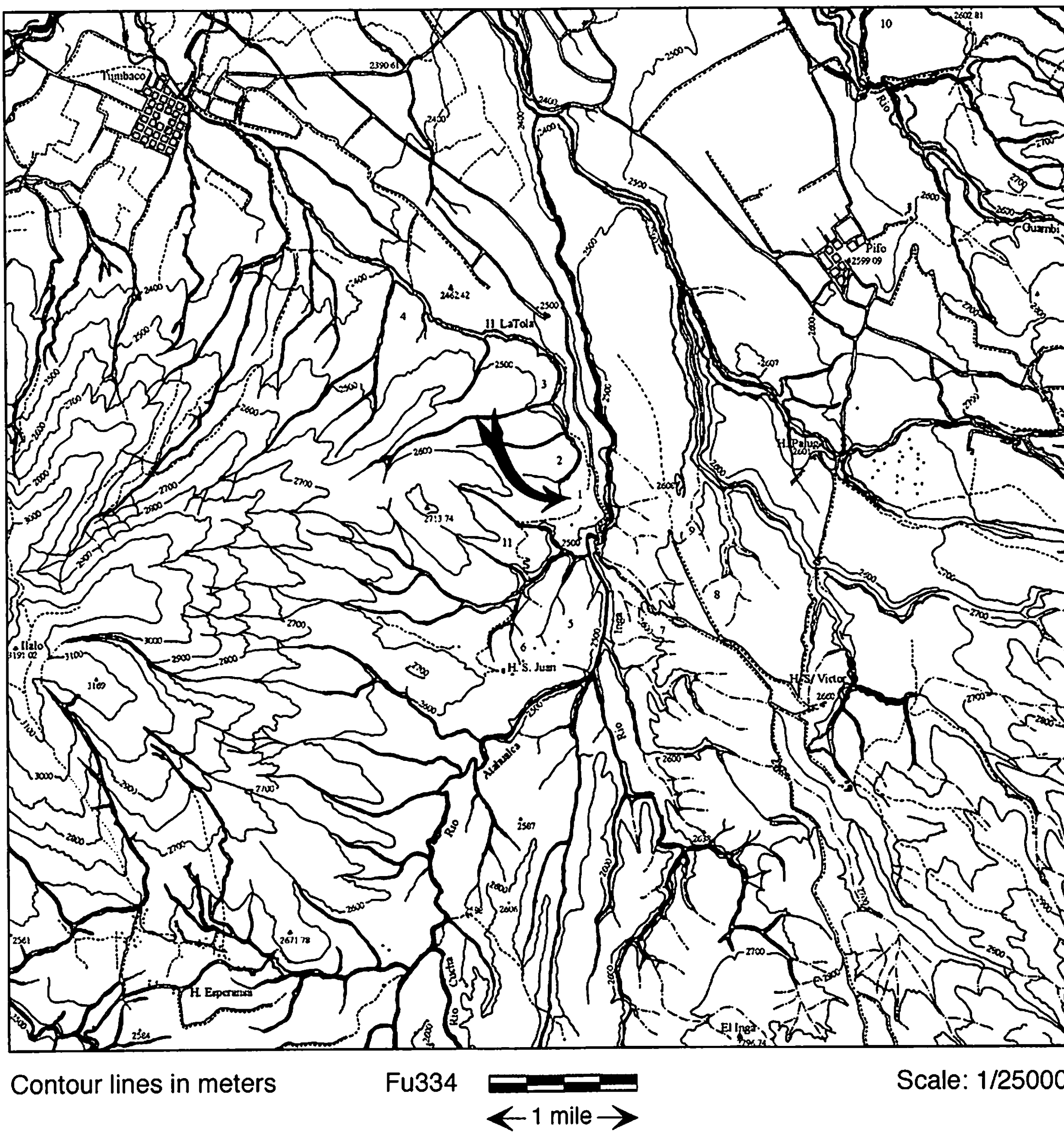


Figure 1. Location of El Inga and other sites in the vicinity: (1) El Inga; (2) Reis Chupa; (3) Santa Lucia; (4) Lozon; (5) San Cayetaino; (6) San Juan; (7) Itul Cachi; (8) Ruvia Cocha # 2; (9) Ruvia Cocha # 1; (10) Oyambaro; (11) Papabamba.

become a tributary of the Guaillabamba river system that empties into the Pacific Ocean at Esmeraldas.

From the site of El Inga, Ilalo Mountain dominates the landscape on the west, while the broad Rio Chiche valley extends toward the north and south (Plate Ia). Across the valley to the east, a range of mountains parallels the Rio Chiche valley to provide the final barrier before entering the montana region and the Rio Napo drainage of the Amazon.

The Rio Chiche valley region around El Inga appears to represent a flat broad valley, but this panoramic view (Plate Ib) is deceptive for the valley is dissected by many canyons and quebradas. Many of these are cut to a depth of several hundred feet, often with precipitous side walls which make survey or cross-country travel difficult. The valley appears to have been filled with volcanic debris, and it is now being dissected by rapid erosion caused by streams that are cutting through these volcanic deposits.

The site of El Inga is located on the surface of this filled valley floor at an elevation of approximately 2550 m above sea level. Immediately to the east is the Rio Inga canyon that has been cut to a depth of between 300 and 400'. Toward the west, the land generally tends to slope upward to Mount Ilalo although encroaching quebradas to the south, southwest and northwest of the site have eroded into the slopes to isolate the site area. Consequently, the site occupies the highest part of the remaining land surface at this point with erosion encroaching upon the area from all directions. In fact, all but a relatively small section of the occupational zone at the site has been eroded away.

The region around the site is presently occupied by numerous farmers who cultivate small plots of land or tend to livestock. Most of the land area that is not denuded of soil is under cultivation. Vegetation is sparse, limited for the most part to coarse grasses or small shrubs; trees are rare and for the most part limited to modern plantings of eucalyptus or fruit trees.

Fossil animal bones are commonly found in the area around the site. The bones and teeth of the mastodon, camel, horse and sloth were observed and collected by Graffham, and many of the local farmers know of localities where large bones are exposed by erosion. Dr. Isadoro Kaplan of Quito has collected numbers of fossil bones, including mastodon, from the quebrada immediately southwest of the site. He also reports the finding of one fragment of mastodon tooth enamel on the surface of the site at El Inga. Dr. Kaplan first collected obsidian artifacts from the site at El Inga in 1947 when he came across the obsidian debris while hunting fossil animal bones nearby. Kaplan later directed Graffham to the site in 1955 or 1956, and, in subsequent trips, Graffham collected the materials which focused our attentions upon this locality.

The site of El Inga occupies a low promontory which has been subjected to extensive erosion. Judging from the occurrence of surface debris, the site appears to have extended over an oval shaped area about 500' wide and 750' long (Fig. 2). Surface material can be found outside of this area, but erosion has clearly displaced some of the surface debris from its point of origin. The above estimate of site area is at best an approximation based upon topography, test pits, and distribution of surface materials. At the present time, however, the actual remaining site area is much smaller than this, for erosion has reduced the occupational area to perhaps one-tenth of its original size. This remains as an erosional remnant on the highest part of the site with several other smaller areas remaining elsewhere. The exposed eroded surfaces surrounding these erosional remnants are represented by a more durable material known locally as cangahua. The occupational mantle of soil rests upon the cangahua (Plate IIb), and, as erosion removes the overlying soils, the cangahua becomes exposed. The artifacts formerly contained in the overlying soil mantle come to rest upon the cangahua surface, which is more resistant to weathering. Consequently, the eroded cangahua surfaces were strewn with occupational debris derived from the soil mantle. The extensive surface collections made by Bell and Mayer-Oakes in 1960 were derived mostly from this area, and, together with the Graffham collection, they probably constitute the major portion of total objects existing at the site.

Surface debris is also to be found eroding out of the remaining portions of the occupational mantle as well as upon the top surfaces which have been subjected to plowing. The erosional remnants that remain have all been subjected to cultivation, and the southern section of the site is still used for growing corn. All parts of the remaining areas have been cultivated, however, as old furrows or evidence of cultivation are still to be observed. The cultivation aids in the continuing erosion of the remaining soil deposits, however, and the useful crop area gets smaller and smaller until it is finally abandoned all together.

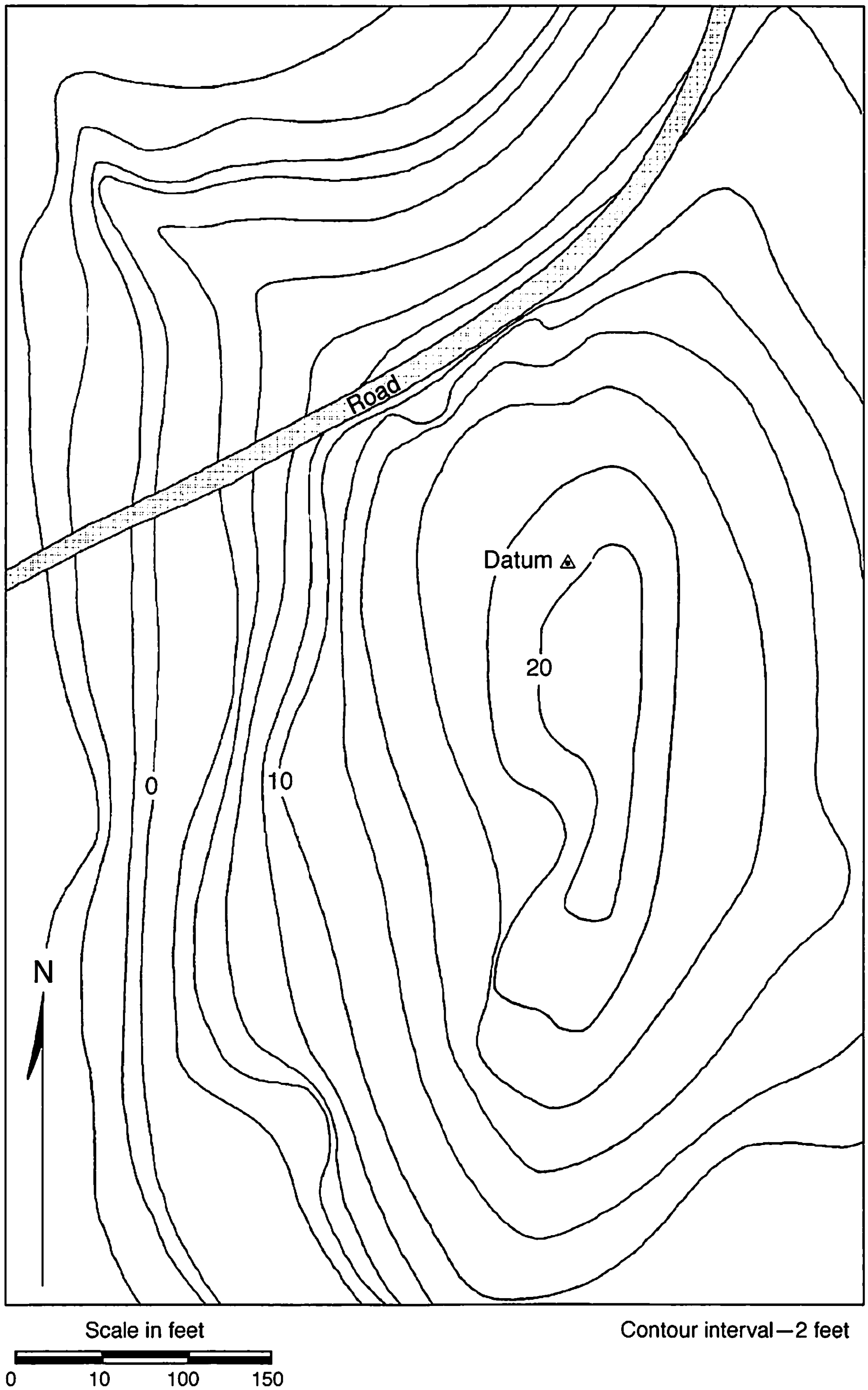


Figure 2. Topographic map of El Inga site, Ecuador.

The erosion that has taken place in the occupational mantle has produced irregularities in the surface of the soils remaining, especially around the edges of the erosional remnants. Consequently, the thickness of the soil mantle may vary from merely an inch or less up to its maximum depth at the thickest part where erosion is minimal. Because of this unevenly eroded surface, specimens picked up on top of the ground may have originated from the deepest part of the occupational zone.

A narrow roadway leading to the Hacienda of San Juan crosses the site to divide it into two unequal portions. This roadway is little used except for foot travel or livestock although ruts up to several inches in depth have been cut into the cangahua in some places. The section of the site to the north of the road appears more heavily eroded although some erosional remnants still are present.

Much of the site is free of vegetation, but tufts of coarse grass and small shrubs are present. Most of the plant growth occurs upon the erosional remnants rather than upon the exposed cangahua. Some plants do, however, occur on the cangahua, chiefly in spots where irregularities have trapped a pocket of soil or wind-blown sand.

The site itself is part of a larger range area used for grazing livestock, especially goats, and the local residents are commonly crossing the area en route to fields or to visit neighbors. An occasional fragment of glass, a bit of modern glazed pottery, or a dried banana peel reminds one that the site is not isolated from the contemporary scene.

DESCRIPTION OF EXCAVATIONS

The primary purpose of the 1961 fieldwork was to obtain archaeological evidence concerning the prehistoric occupants of El Inga. The occurrence of fluted, fish-tail base projectile points, resembling those found in the lowest levels at Fell's Cave in Chile, gave promise not only of furnishing data upon the early inhabitants of Ecuador, but in supplying new evidence which would be useful for understanding early man's movements throughout South America. It was necessary to obtain examples of this point type from carefully controlled excavations in order to identify an archaeological assemblage and to learn as much as possible about this assemblage. In striving to achieve this goal, it was planned to excavate a large portion of the site to obtain as many artifacts as were available in their proper stratigraphic relationship.

It was also hoped to obtain charcoal for radiocarbon analysis, to locate any occupational features that might be present, to obtain any animal or human bones that might be associated with the occupation, and to learn whether the site contained a single or multiple archaeological complex. In addition, samples of obsidian were to be collected specifically for the obsidian dating research project being conducted by Dr. Clifford Evans of the Smithsonian Institution, United States National Museum at Washington, D.C. To aid in this research, soil temperature readings were to be taken, and Dr. Irving Friedman of the United States Department of the Interior Geological Survey, Washington, D.C., provided instructions and a specially made thermopile and soil auger for that purpose.

A few items of equipment were shipped from Oklahoma to Quito for use in the field. These included such things as cameras, an alidade with tripod, plane-table and stadia rod, steel tapes, marking pens, record forms, and minor articles which may not have been readily available in Quito. Other articles such as shovels, mattocks, trowels, brushes, string, sacks, plastic bags, glass jars, metal hardware cloth, wood stakes, etc., were obtained in Ecuador. Upon the close of the fieldwork activities the useful equipment which had been locally purchased was donated to the Casa de la Cultura.

The actual excavations at El Inga were initiated on June 20, 1961, and continued until August 23, 1961, a period of slightly more than two months. During this time the field crew varied from 4 to 23 workmen, derived chiefly from the rural population surrounding the site (Plate IIa). During the initial phases of excavation, only four workmen were used, but the crew was rapidly enlarged to the maximum number, which was maintained throughout most of the season. Toward the close of the excavations, a reduced crew finished up work on one stratigraphic block and finally refilled the trenches.

The excavations were centered upon the highest section of the site within the largest of the erosional remnants still present. This is the section that had been previously tested by Bell and Mayer-Oakes in 1960 and appeared to offer the most promising locality. Additional remaining areas of the site were examined by three test pits consisting of two squares each.

A datum point was established upon the can-

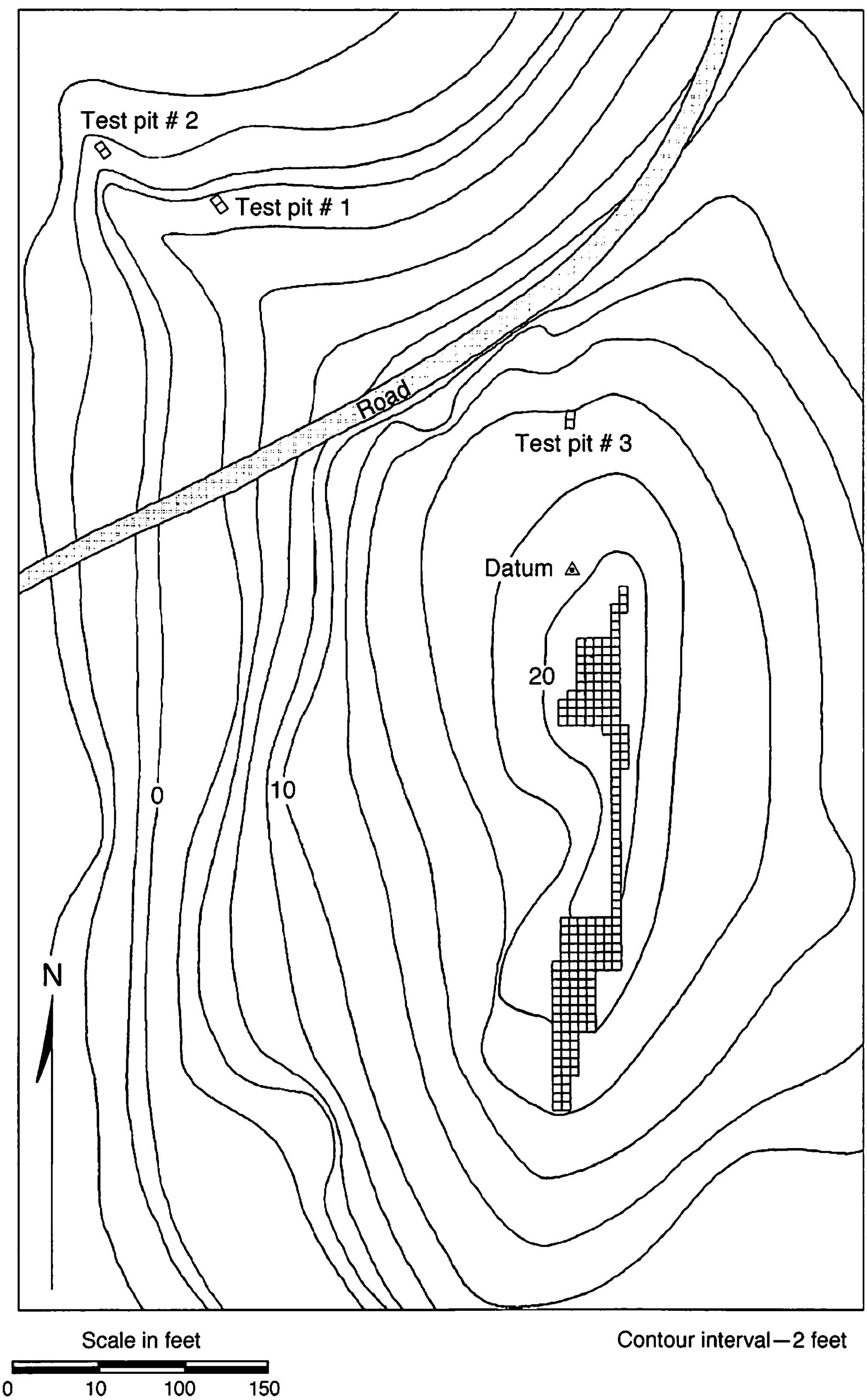


Figure 3. Contour map of El Inga site and location of all excavations.

gahua surface in a location that would not be disturbed by the fieldwork (Fig. 3). For this datum, a 3' iron pipe was driven into the cangahua but was allowed to project slightly above the ground surface. This pipe served as a basic datum for all surveying with all horizontal and vertical measurements being based upon this point of departure. To facilitate vertical measurements by avoiding plus and minus readings, the datum plane was assigned an arbitrary level of +20', and all vertical measurements were made with reference to this plane. Throughout the season, a contour map based upon 2' intervals was prepared (Fig. 3), and the surface of the ground at each stake was recorded. Horizontal and vertical measurements were taken from datum or a grid stake which served as a secondary datum.

A grid system based upon 5' squares was superimposed upon the site by the use of an alidade (Fig. 3). Two zero coordinates, one running north and south and the other running east and west, were used as base lines. Additional grid lines placed at 5' intervals to the north or south were numbered in consecutive order from zero, S1, S2, S3 or N1, N2, etc. Grid lines to the east or west were labeled as left or right when facing north, L1, L2, L3 or R1, R2, R3. Each individual square was designated by the stake located in the southeast corner. The three test pits were not considered as a part of this primary grid system, but were merely labeled by number and plotted upon the master map plan.

The placement of the grid system upon the site was determined chiefly by the irregular outline of the erosional remnant. It was desirable to have the initial exploratory trench extend as far as possible across the site to provide an interrupted profile. Hence, the north-south coordinate was placed to provide a guide for the exploratory trench which ran for a length of 210'. This trench was then extended westward for 35' and southward for 80' so as to include the most southern section of the site. From this, a north-south cross section of the occupational layer was available for almost the entire length of the remnant area (Fig. 4).

Utilizing the information derived from this exploratory trench, additional squares were excavated in the areas which appeared to be the most fruitful. Consequently, two major areas were excavated, one at each end of the exploratory trench in the widest parts of the erosional remnant.

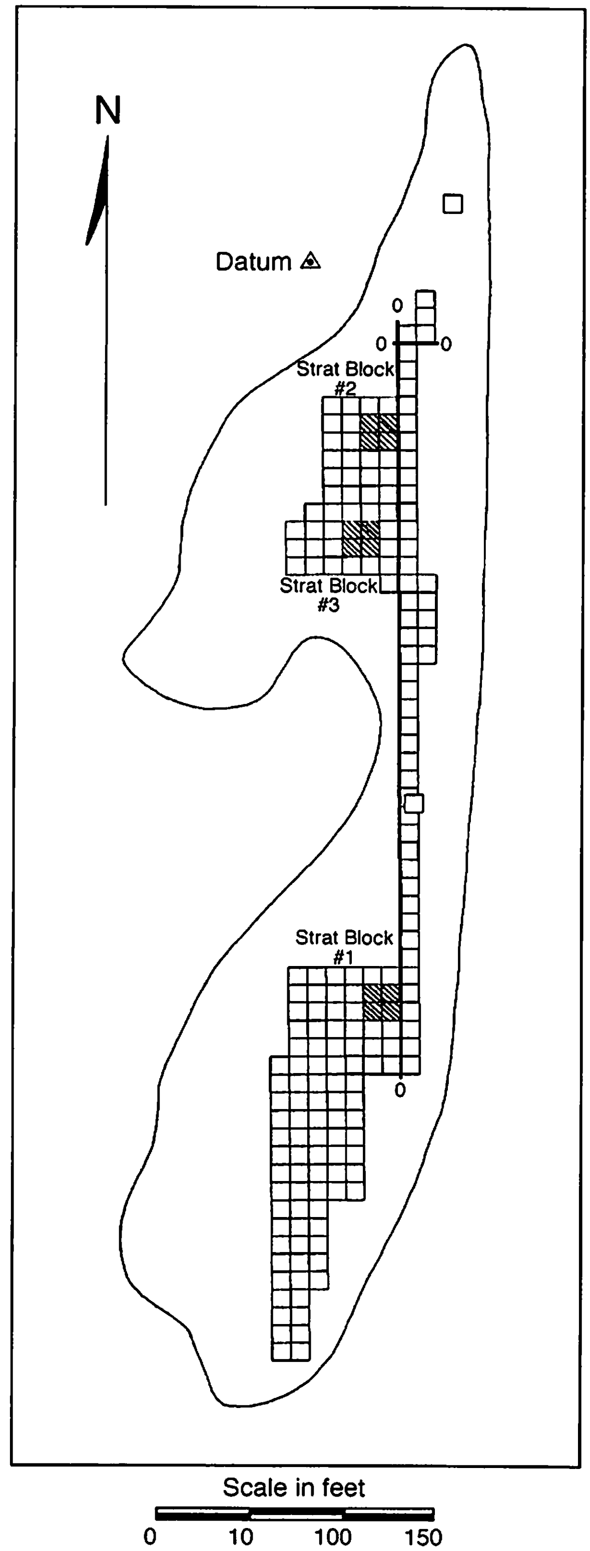


Figure 4. The 1961 excavation grid and location of stratigraphic blocks.

The 1960 test pits had indicated an occupational mantle having a depth of 18 to 20", unmarked by any distinct strata differentiation other than the lighter colored plow zone at the surface. In view of the shallow deposit and the need to look for stratigraphic differences, the excavations were made by use of arbitrary levels, 4" in thickness, measured from the ground surface.

Throughout the excavations the workmen were instructed to proceed with caution and to be alert for artifacts, charcoal, bones, stones or rocks, color changes in the soil, differences in soil texture or compactness, or any unusual change or discovery. When such an item was found, it was called to the attention of the field supervisor for observation or recording. The workmen were also informed as to the importance of properly associating the objects from each level with the proper sack, and items of doubtful provenience were either thrown away or kept as a part of a general surface collection.

The excavation of an individual square was normally done by two workmen. One man using a shovel, mattock, and trowel would excavate the earth from a single level while his partner screened the dirt for artifacts or debris. All of the dirt from the excavations was screened through a 1/4 inch mesh hardware cloth, and all items found in the levels were collected in a paper sack marked with the site, square, level, depth, and date. Individual artifacts, when found and located in situ, were recorded separately within the square by position and depth. Upon completion of the level the walls and floor of each level were planed with a trowel, shovel, or mattock for observation. A level report form was then filled out by the supervisor, and excavation of the next level was continued.

The number of levels removed within each square varied somewhat from one section of the site to another depending upon the irregularities of the surface as well as the underlying cangahua. In the majority of squares, either four or five 4" levels were removed, but in squares which were situated in more eroded areas, three levels would remove the occupational deposit. In one or two instances, where the eroded cangahua surface had low areas in it, an additional level was sometimes required. In the early part of the work, the squares were excavated for several inches into the cangahua in order to be sure that it was sterile and that it did not contain artifacts or evidence of occupation. As it became clear that the cangahua was sterile, however, square excavation was usually terminated with the level that included the top section of the cangahua. Since work was progressing in 4" levels, this sometimes meant removing 1" up to perhaps 4" of cangahua, depending upon the surface irregularities of the cangahua.

In some instances, the 4" interval would fall about on the contact between the cangahua and the overlying soil zone. In such cases the cangahua was not removed unless the contact level had produced more than one chip or item of debris. The general rule of thumb was to continue square excavation until the last level was sterile, or almost sterile, and in contact with or excavated into the cangahua.

In the area of contact between the cangahua and the overlying soil zone, the occasional finding of a single chip was not considered as significant since the irregular and fissured surface would be filled in with soil. In brief, when leveling the floor of the square at this unconformity between the cangahua and the soil mantle a predominance of cangahua and absence of debris meant abandonment of the square.

Aside from the plowed zone, the soils at El Inga were very hard and compact which necessitated the use of mattocks to loosen the soil in excavation. Consequently, some artifacts were broken or damaged by the workmen although many of them became quite skilled at manipulating this heavy tool. Moreover, some specimens were not discovered until they were exposed in a crushed clod of dirt or by the screening. In such cases, the association with the level is known, but the exact position within the level is uncertain.

Stratigraphic Blocks

Three stratigraphic blocks were excavated during the season. Their main purpose was to provide a more sensitive sequence of arbitrary levels within the occupational deposit and to provide soil samples which might be useful for radiocarbon dating, pollen analysis, or soil analysis. Stratigraphic Blocks #1 and #2 were placed at the south and north ends respectively of the excavated area after the initial north-south exploratory trench had been completed. The third stratigraphic block was placed in an area believed to be somewhat more productive in artifacts and debris, based upon evidence from squares already excavated (Fig. 4).

Each stratigraphic block was 10' square and, hence, included four squares of the grid system

(Plates III-V). Each block was carefully excavated by 2" levels, measured from the ground surface. Excavation of the stratigraphic blocks was done either by Bell or by two workmen who were trained for that specific purpose. When the stratigraphic block had been selected for excavation, all squares adjacent to it were excavated in order to isolate the block from the surrounding area. This made excavation of the block easier and, at the same time, prevented any possible admixture with artifacts from nearby squares. Each control block was prepared in this manner prior to any actual excavation of the block.

The excavation of each stratigraphic block preceded by removing a 2" level from one quadrant, or one of the four quarters. As one quarter was removed and the second quarter started, a strip of soil for depth control was left along the grid line to separate the four quarters. When the first 2" level was finally removed from all quarters, the central control strips were then removed except for a small portion at the center which served as a control block for the removal of subsequent levels. The floor of each level was carefully troweled for possible features or disturbances, photographed, recorded, and then the same procedure was followed in excavating the subsequent levels. Each stratigraphic block was excavated to the contact with the underlying cangahua, and finally the remaining control pillar at the center was removed.

The excavation of the stratigraphic blocks was a slow and time consuming process. Each level was removed by trowel or mattock, and almost all artifacts recovered were observed and measured in situ. The hardness of the soil made it difficult to remove more than about one level per day, and yet this hardness of the soil helped in keeping the exposed block from slumping or breaking down around the sides and corners. As the block became dried out, especially over a week end when it was not being worked, it was sometimes necessary to moisten the soil with water to continue excavation.

Test Pits

Three test pits, 5 by 10' in size, were dug in sections of the site outside the main area of excavation (Fig. 3). These were placed within other isolated erosional remnants of the site for testing and evaluation. Each test produced a similar profile to that of the main excavation and confirmed the presence of the occupational layer over a more widespread area. As these tested areas offered no greater promise than the main area of investigation, the squares were refilled and efforts were directed to a single locality.

Observations

A cross section of the site revealed a simple profile composed of two distinct deposits: a dark colored soil mantle containing the artifacts and occupational debris, and the underlying cangahua which was sterile (Fig. 5; Plate IIb). The surface of the cangahua was very irregular and weathered, its light color contrasting with the dark colored soil mantle resting upon its surface. The soil mantle extended from the cangahua contact up to the present surface and in most places averaged between 16 and 18" in thickness. This could be differentiated into two clear cut zones; the upper lighter colored section, from 3 to 9" in thickness resulted from plowing, and the lower dark colored section was very hard and compact. This lower dark colored section varied slightly in color in some areas; it was darkest about 5 or 6" above the cangahua surface and became slightly lighter in color both above and below this area. This darker zone within the soil mantle may indicate a period of more intensive occupation.

The upper portion of the occupational mantle, designated as the plowed zone, varied in thickness from 3 to 5" at the north section of the site to as much as 8 or 9"at the south end. In view of this variation and the lighter color, the possibility that it might represent a natural deposit was seriously considered. The area of contact between the two zones was examined at the stratigraphic blocks as well as elsewhere, and in several cases the marks resulting from the plow tip were evident upon the troweled surface. Furthermore, at localities where these could be checked with old but visible furrows, the plow tip lines matched the deepest part of the furrow. Consequently, there is no question but that the top portion of the occupational mantle is distinguishable only because of the cultivation. The lighter color is probably produced by the addition of wind blown sand which became mixed with the soil during cultivation.

Dr. Charles Mankin of the School of Geology at the University of Oklahoma analyzed one sample of cangahua and several samples of soil taken from different levels of Stratigraphic Block #3. Aside from the organic matter present in the soils as the result of occupation, the soils and cangahua are identical in their composition. These studies also indicate that the material is of volcanic origin and that the soils were derived from the underlying cangahua.

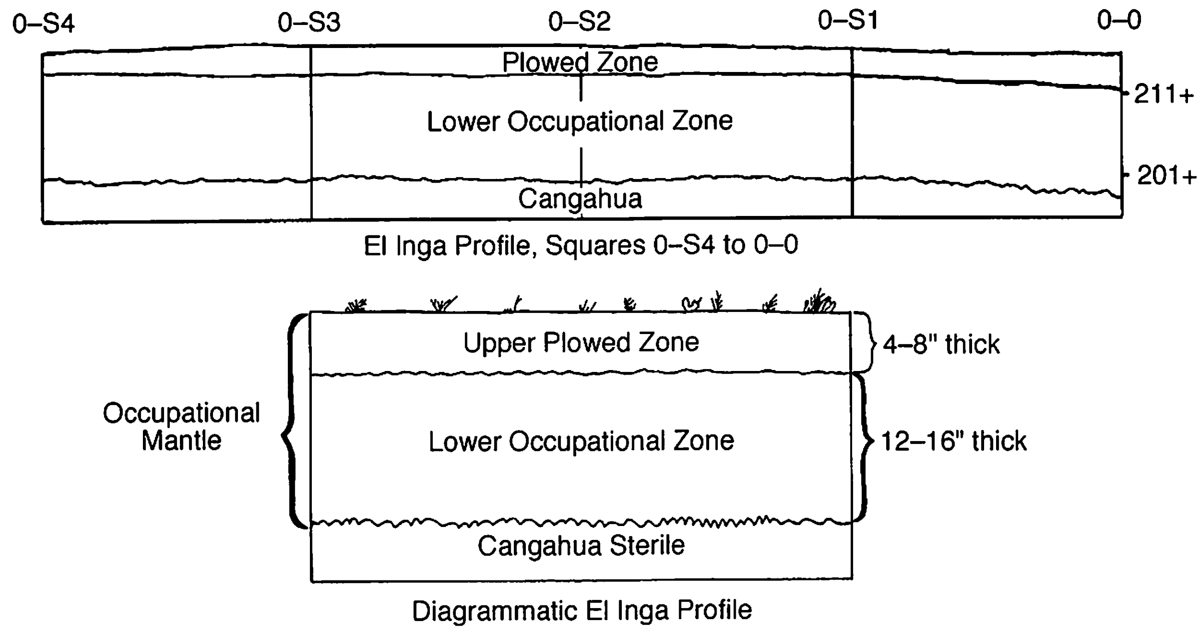


Figure 5. Soil profiles at El Inga site.

It was anticipated that some features such as a hearth or fireplace might be found during the excavations. This was not the case, however, and nothing found was designated as a feature throughout the entire digging season. In fact, each newly excavated square was quite like the previous one, producing only chips of obsidian or basalt and the occasional stone artifact. The only items which might have been designated as features were concentrated areas of obsidian chips which are discussed along with the artifacts as chip caches. These are represented by chips of obsidian and an occasional artifact, which were found together in a restricted spot, usually less than 8 or 10" in diameter. It is not clear whether these actually represent an intentional cache of chips of raw material or whether they may have become concentrated together in some other manner. They certainly represent concentrations of flakes within a specific limited area, but this could result from water action or as a byproduct of tool manufacture as well as an intentional cache.

Every effort was made to obtain charcoal for radiocarbon dating, and the crew was instructed to watch carefully for charcoal, ash, or any evidence of fire or a hearth area. The dark color of the soil suggested that organic matter was present, and a chemical analysis made by John Schleicher and Charles Mankin of the Oklahoma School of Geology on soil samples collected in 1960 indicated the presence of carbon in amounts between two and three percent. The presence of visible particles of charcoal during the excavations, however, was very limited. The largest particle of charcoal observed during the season measured no more than 2 mm in maximum length, and most examples were evident only by a black fleck or black smear which would appear upon a scraped surface. Even such meager indications of charcoal were rare throughout the site, and when found in any quantity or within a limited area, a soil sample containing the particles was collected for possible radiocarbon dating.

The recovery of bone specimens from El Inga excavations was also a disappointment in that little evidence of bone material was present. There are three fragments of animal teeth, primarily enamel, and one small fragment from an animal bone. The latter fragment, damaged beyond identification, came from level 1 (0 to 4"), which included the surface and may well be from refuse discarded by the present inhabitants. A small area of bone fragments was found in Stratigraphic Block #3 at a depth of 17" below the surface, and considerable time was spent working with pocket knives, teasing needles and brushes to carefully expose the fragments. Although it was hoped that some large identifiable pieces might be uncovered, nothing was found except a small area about 5" in diameter containing several bits of broken bone. The largest piece measured less than 3 cm in length and represents an unidentifiable fragment from a larger bone. Consequently, the three fragments of teeth represent the only potentially useful bone specimens from the site. These have been examined by Dr. David Kitts of the School of Geology at the University of Oklahoma who has made the following observations: the teeth are small and high-crowned; they are too small to represent cattle and bison are not known from South America; they are too low-crowned to represent deer; the structure as preserved is consistent with the hypothesis that the specimens represent the llama. Two specimens were found in level 2 (4 to 8"), and one specimen was found in level 5 (16 to 20"); all three came from the southern section of the excavation.

Every effort was made to observe potential features such as pits or disturbances, hearths, or scattered stones which might indicate evidence of occupation. The presence of any stone larger than five centimeters was carefully noted and left in place until the surrounding area could be investigated for additional stones or possible evidence of a fireplace or feature. The presence of stones of this size, however, was rare, and the total recovered from the entire excavation numbered only 11. These were unrelated to each other and only one specimen displays evidence of having been used in any way, although they certainly were carried to the site from elsewhere and must have served some purpose.

The absence of occupational features at El Inga, with the possible exception of the chip caches, limits our main source of knowledge about the inhabitants to information to be derived from the stone artifacts and chipping debris.

LABORATORY PROCEDURES, ANALYSIS AND ARTIFACT DESCRIPTIONS

Laboratory Procedures and Analysis

Throughout the excavations at El Inga, an effort was made to save all items found in the digging. These included not only artifacts, but chips of obsidian, flint or basalt, pebbles, stones or any object encountered in the excavation. The total available sample was obtained for the possible information it might provide in identifying areas of intensive occupation or in supplying data on stone working techniques. Occasionally a chip or flake would be discarded because of uncertain provenience, but such instances would certainly constitute less than 0.1% of the total sample.

The Casa de la Cultura in Quito authorized the shipment of all the specimens to the University of Oklahoma in Norman for analysis and study. The officials of the Casa, Sr. Carrion and Sr. Larrea, assumed the responsibility of preparing the necessary documents and papers to clear the Ecuadorian customs office and helped in various ways to facilitate actual shipment. The specimens were shipped by air freight from Quito to Miami, Florida, and from Miami to Norman, Oklahoma by truck transport. Mr. H. A. Messersmith of the United States Department of Agriculture Office in Miami, and Mr. E. A. Burns, of the Hoboken, New Jersey office, provided authorization for the soil samples and artifacts to pass through United States Customs without serious delay. All of the materials arrived at the Stovall Museum in Norman in good condition and without damage.

In the laboratory each individual sack of material was sorted to separate the artifacts from the debris. The artifacts were then washed, catalogued and crudely sorted into various categories-such as knives, scrapers, points, etc. The debris was replaced in its original sack for later study and analysis. This routine work was done, under supervision, by Don Wyckoff, Elizabeth Pillaert and Sigrid Schmitt and occupied a considerable number of man-hours for completion.

All items classified as debris were rechecked by Bell for each bag of material. It is quite possible, however, that some few items included with the debris may represent an unrecognized artifact or a fragment from a classifiable object such as a primary burin spall. It is sincerely hoped, however, that such oversights were minimal.

In the analysis which follows, the recovered materials are discussed under these two main categories: Debris and Artifacts.

Debris or Refuse Materials

Included in the debris material from El Inga are chips or flakes of obsidian, basalt or flint, small pebbles and stones. The total number of these items is 79,735 pieces with 78,878 having been found in the main area of excavation and 857 having been found in the test pits. The distribution of these items according to depth is shown in Table 1 and Table 2. Each class of objects will be discussed separately.

Plate Ia: View of rugged canyon setting near Tambuco north of El Inga site.

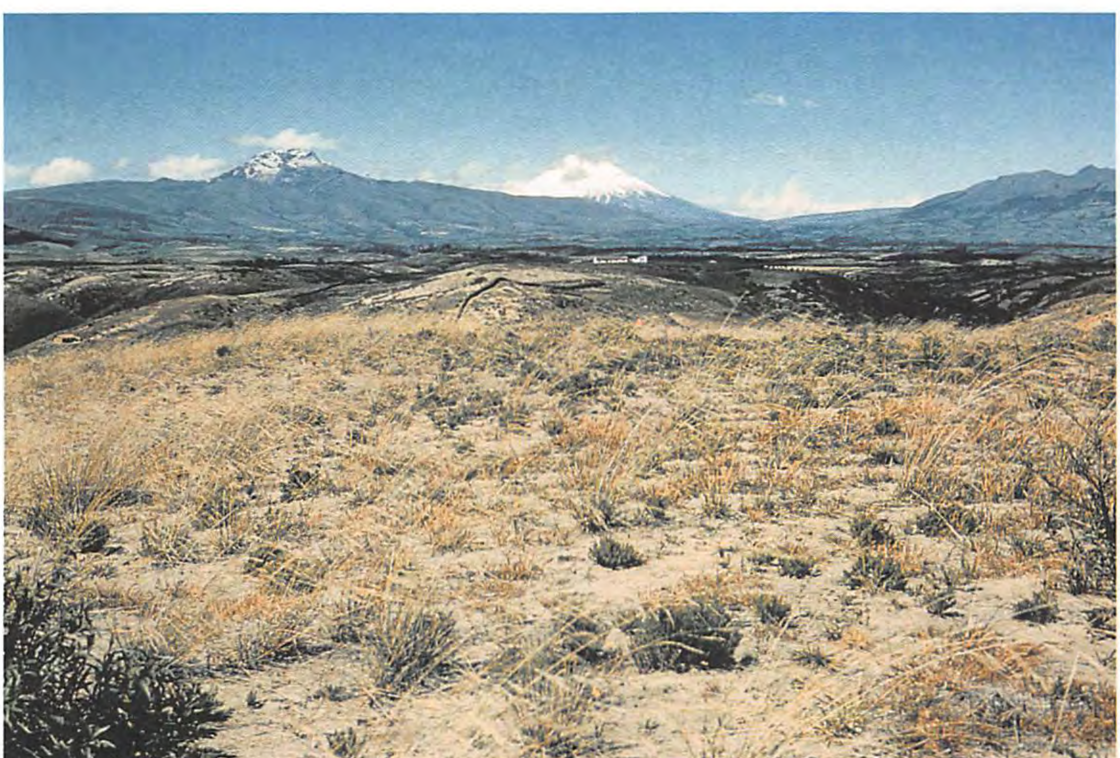


Plate Ib: Looking south across El Inga site; Cotopaxi volcano in the background.

Plate IIa: Workers excavating squares S1 and S2 of Right 1 trench.

Plate IIb: Soil profile at O-S25. Cangahua visible at base of profile.

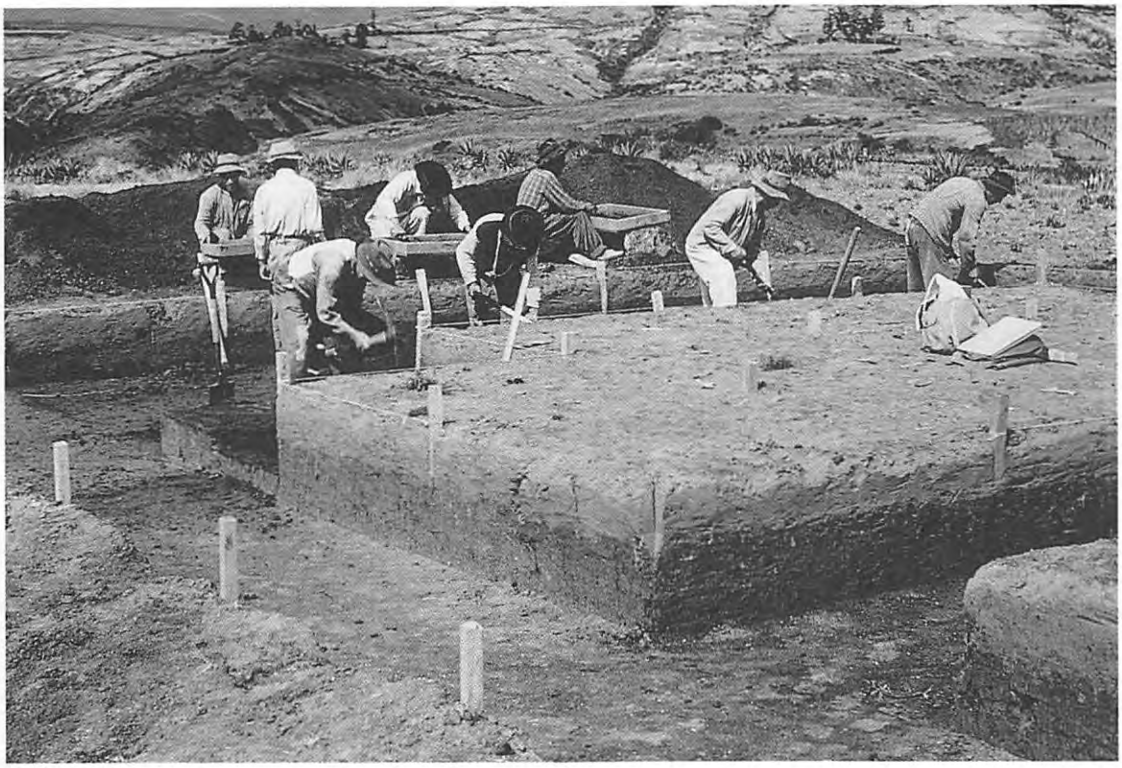


Plate IIIa: Crew clearing squares around Stratigraphic Block #1.

Plate IIIb: Level 1 removed from one square of Stratigraphic Block #1.

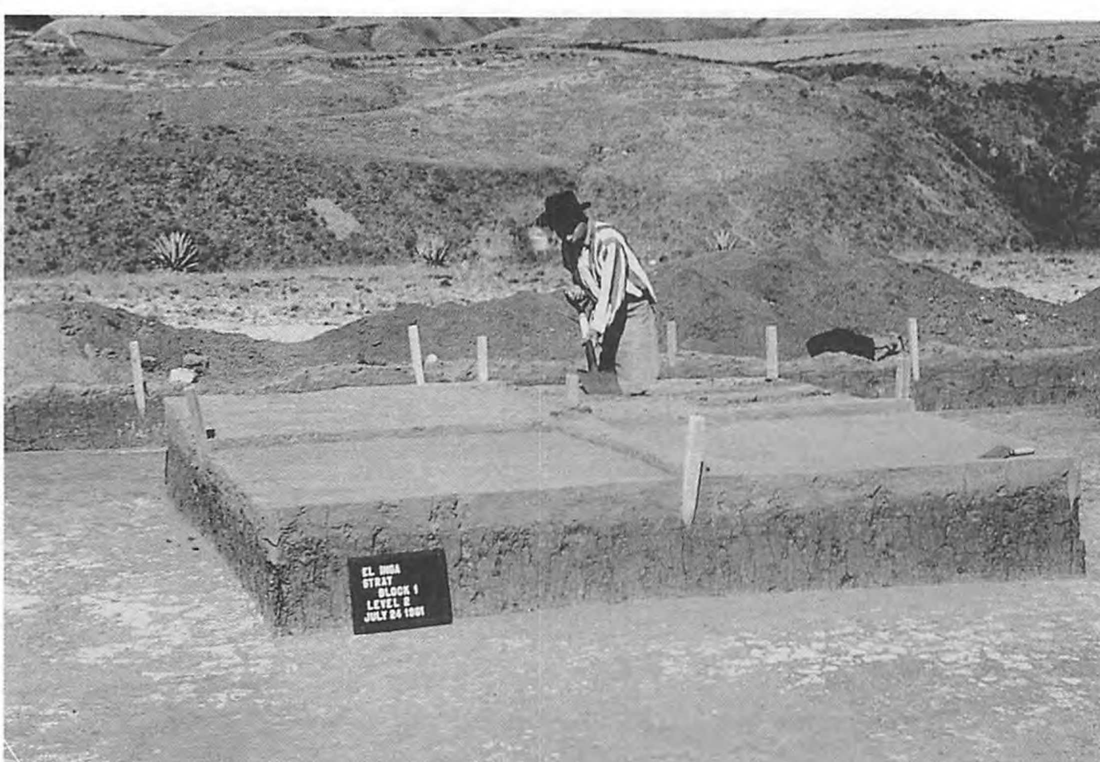


Plate IVb: Level 2 being removed from Stratigraphic Block #1.

Plate Va: Level 5 removed from Stratigraphic Block #1.

Plate Vb: Level 6 removed from Stratigraphic Block #1.

Plate VIa: View south across El Inga site after refilling.

Plate VIb: The El Inga crew and friends. July 28, 1961.

Table 1. El Inga debris: Distribution by levels excluding test pits.

Levels dug	Depth	Obsidian	N/L	Basalt	N/L	Flint	N/L	Pebbles	N/L	Stones	N/L	Total
193	0 to 4"	12,898	66.8	574	2.9	11	0.05	1,307	6.7	2	0.01	14,792
193	4 to 8"	17,921	93.3	410	2.1	15	0.07	581	3	1	0.005	18,928
190	8 to 12"	22,901	120.5	662	3.4	22	0.11	277	1.4	6	0.03	23,868
169	12 to 16"	17,793	105.2	578	3.4	12	0.07	295	1.7	1	0.005	18,679
146	16 to 20"	1,952	13.3	31	0.21	1	0.006	202	1.3	1	0.006	2,187
11	20 to 24"	389	35.3	3	0.27	0	0	21	1.9	0	0	413
1	24 to 28"	7	7	4	4	0	0	0	0	0	0	11
	Totals	73,861		2,262		61		2,683		11		78,878

Table 2. El Inga debris: From test pits.

Levels dug	Depth in inches	Obsidian	Basalt	Flint	Pebbles	Stones	Total
6	0 to 4	112	54	0	70	0	236
6	4 to 8	172	13	0	18	0	203
6	8 to 12	157	7	0	10	0	174
5	12 to 16	171	15	0	8	0	194
3	16 to 20	40	3	0	4	0	47
2	20 to 24	2	1	0	0	0	3
	Totals	654	93	0	110	0	857

Stones

The items herein classified as stones include specimens measuring from 4.5 to 13.5 cm in maximum length. Smaller stones have been classed as pebbles, and nothing larger than these were found in the excavations. All specimens are either whole or are fragments from large water worn pebbles of extrusive igneous rock similar to those present in the stream beds of the area. With a single exception, none of the stones shows any use or abrasive marks to suggest its former function at the site. One specimen discussed under Artifacts displays a series of parallel scratch marks or shallow grooves which may have resulted from use as an abrading tool.

Of the 11 stones found, 6 were at a depth between 8 and 12", which is also the zone containing the maximum number of other debris items. Two pieces were found in a single square, but otherwise they were widely distributed (Fig. 6).

Eight specimens were found in the northern section of the excavated area while only three came from the southern section. No particular significance is attached to the horizontal or vertical distribution of the stones except for the suggestion that the northern section of the site may have been more intensively occupied.

Pebbles

There is a total of 2,683 items classed as pebbles from the excavation. These are all under 4.0 or 5.0 cm in maximum length, and the great majority is much smaller, averaging around 1.0 cm in diameter. They include small stones or pebbles and angular fragments of rock derived from the region. Also included as pebbles are

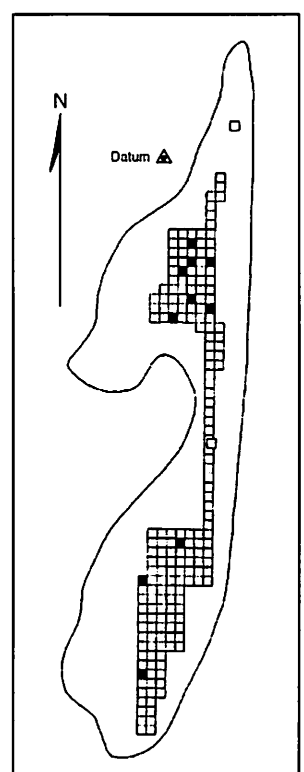


Figure 6. Distribution of stones including all levels.

small pieces of cangahua which stubbornly resisted the workmen's efforts to crush them through the metal screens.

The pebbles are most plentiful in the first level (0 to 4") and become less and less frequent as the depth increases. They are about equally scattered over the site area except in level 2 (4 to 8") where they are more plentiful at the south end of the excavation (Fig. 7). The vertical and horizontal distribution of the pebbles is believed to have no significance so far as the aboriginal occupants of the site are concerned.

Obsidian Chips

There is a total of 73,861 obsidian chips from the main area of excavation and 654 from the test pits. These include chips, flakes, or small irregular pieces of obsidian which represent refuse from artifact manufacture. The specimens range in size from less than 0.5 cm to a length between 6.0 and 7.0 cm, although the majority are less than 2.0 or 3.0 cm in length.

The obsidian appears to be of high quality for artifacts, and much of it is transparent with thin flakes being almost as clear as window glass. Most of the sample is a gray or black smoky color although some specimens of red or red-brown color are present. Stripes or variegations also occur, chiefly in the form of black streaks or bands running through the material. Occasionally, a flake exhibits one surface having a frosted or weathered effect, rather similar to the cortex which may occur on a flint nodule, which indicates that it was derived from a boulder or weathered nodule of obsidian.

The source for the obsidian used at El Inga is not established beyond question as this was not carefully investigated. Sr. Jorge A. Ribadeneira, Professor of Geology at the Universidad Central in Quito, said the nearest source for obsidian would be Mount Antisana, a volcanic peak located about 35 km southeast of the site. Both obsidian and basalt deposits are present at Mount Antisana, and this may be the point of origin for the raw materials at El Inga. Specimens from the Antisana locality and those from El Inga compare favorably, but additional unreported sources may be available elsewhere. On the basis of local knowledge, however, this appears to be the nearest source of supply to the site. Unfortunately, it was not possible to investigate the Mount Antisana region in the time available.

The obsidian chip debris represents the most common item found in the excavations, and it far outnumbers all other items in quantity. The distribution of obsidian chips according to the various levels is shown in Table 1 and Table 2. The total number of chips found in any single square ranged from a minimum of 42 up to a maximum of 1614. The total number found in any single level ranged from zero to a maximum of 1262. The major portion of all obsidian chips was found in the occupational mantle between 8 and 16" in depth, and the frequency tends to become reduced both above and below this zone. For comparisons between the various levels as shown in Table 1, the average number of chips per level has been shown under the column N/L. This expresses the relative number of chips for a specific volume of earth (5' by 5' by 4") and is obtained by dividing the total number of levels (L) into the total number of chips found in those particular levels (N). This has been done to provide a more realistic comparison between the various levels in terms of obsidian chip frequency. Obviously, the total numbers should not be used unless the total number of excavated levels is the same for all squares. Since the number of levels dug varied from square to square and became reduced at the lower depths, this should be taken into account.

In terms of vertical distribution throughout the site, the maximum number of obsidian chips occurs in level 3 (8 to 12") with level 4 (12 to 16") being next in frequency. The quantities decrease gradually above this zone and are considerably smaller in the lower sections of the occupational mantle.

The horizontal distribution of obsidian chips throughout the various levels is shown in Figure 8. To illustrate this distribution, only squares having the average or more than the average number of chips per level have been designated. It is evident that the horizontal distribution of obsidian chips varies from one level to another; for example, in level 1 (0 to 4") they are more abundant in the northern section of the site while in level 4 (12 to 16") they are more abundant in the southern section. The significance of these distributional differences is not clearly understood although it presumably indicates shifting areas of occupational intensity or tool manufacture.

Basalt Chips

There is a total of 2262 basalt chips from the main excavation and 93 from the test pits. These include chips, flakes, and chunks of material probably derived from the manufacture of arti-

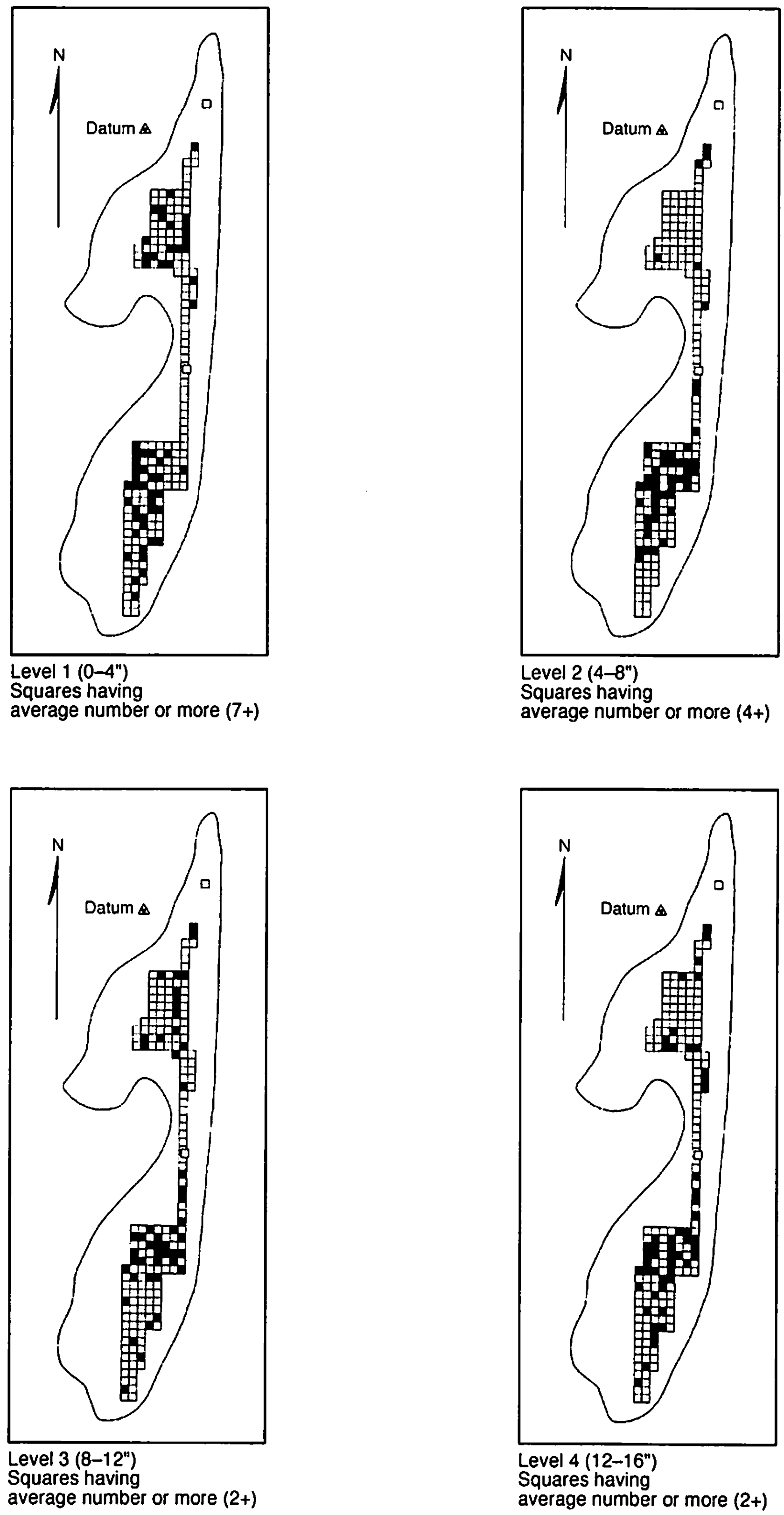
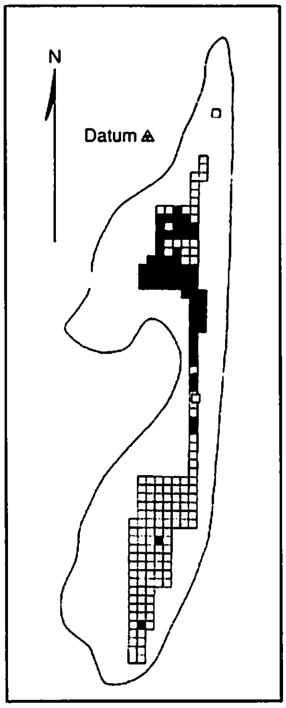
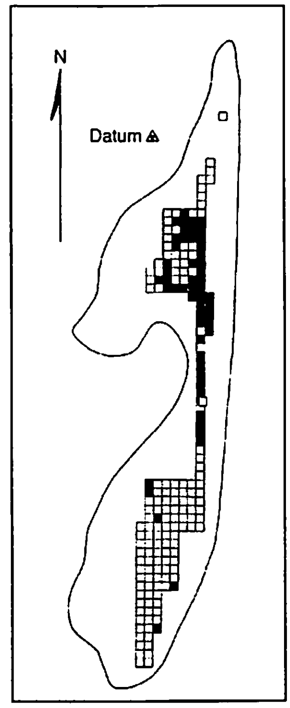


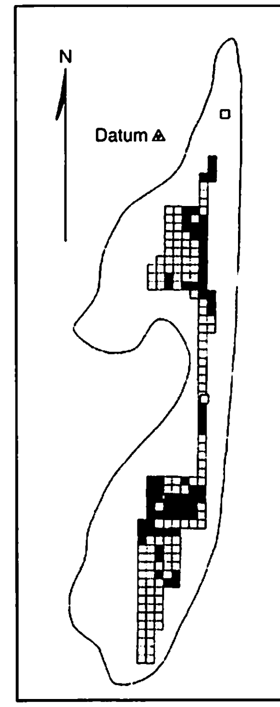
Figure 7. Distribution of pebbles



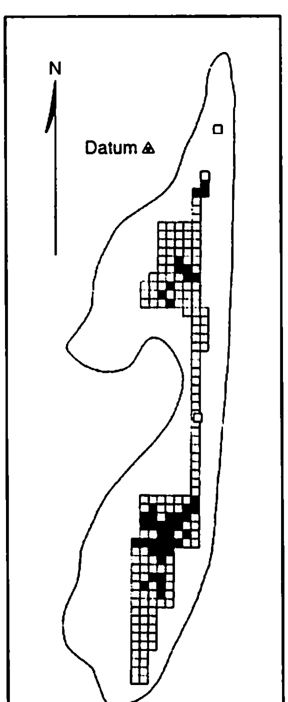
Level 1 (0–4")
Squares having
average number or more (67+)



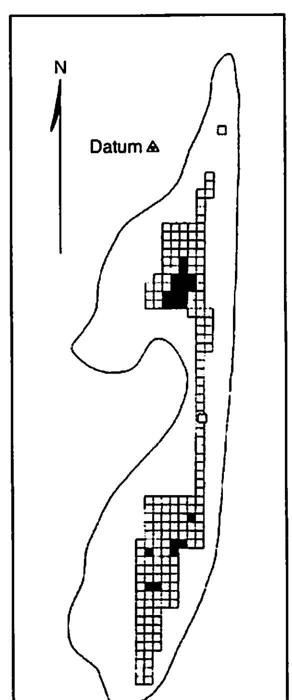
Level 2 (4–8")
Squares having
average number or more (94+)



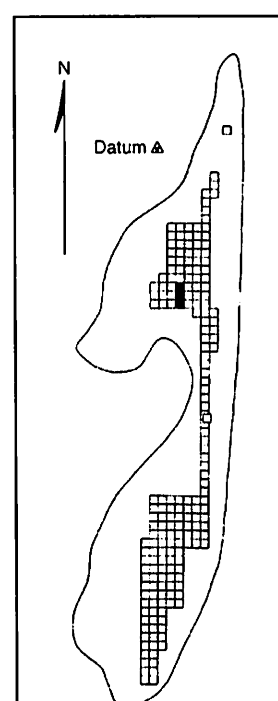
Level 3 (8–12")
Squares having
average number or more (121+)



Level 4 (12–16")
Squares having
average number or more (106+)



Level 5 (16–20")
Squares having
average number or more (14+)



Level 6 (20–24")
Squares having
average number or more (36+)

Figure 8. Distribution of obsidian chip debris.

facts. They range in size from less than 1.0 cm to 6.0 or 7.0 cm in length with the average ranging between 2.0 and 4.0 cm. In general, the average sample of basalt chips is somewhat larger in size than the average sample of obsidian chips.

Included as basalt chips are basalt, andesite and other extrusive igneous rocks which would fracture in a conchoidal manner. For this report, the general term basalt is used to refer to all of these materials. The source of this material is uncertain although deposits of basalt are available at Mount Antisana as in the case of the obsidian. Boulders of basalt are also to be found in the streambeds of the area.

The basalt chips are much more rare than chips of obsidian throughout the site. The vertical distribution according to the various levels is shown in Table 1 and Table 2. Like the obsidian chips, the basalt chips are most plentiful in the zone from 8 to 16" in depth and become less frequent both above and below this zone.

The number of basalt chips per square ranges from zero to a maximum of 185, and the number per level ranges from zero to a maximum of 144.

The horizontal distribution of basalt chips is illustrated in Figure 9. It follows essentially the same distribution patterns present for the obsidian chips and suggests that both obsidian and basalt were being utilized by the inhabitants at the same time.

Flint Chips

There is a total of 61 flint chips from the excavations. They are all fairly small in size and measure under 2.0 or 3.0 cm in length. Items classified as flint chips include flakes of flint, chert, or a similar silicious material excluding obsidian or basalt. Most of the specimens are represented by colors ranging from a light brown or tan to a dark gray. Flint in the form of artifacts or chipping debris is very rare at the site, and, although the possible source of supply is unknown, it was certainly carried into the site by the inhabitants.

The flint chips appear to be well scattered throughout the site area, and, like the obsidian and basalt chips, are most abundant in the zone from 8 to 12" in depth. The vertical distribution is shown in Table 1 and Table 2. The maximum number of flint chips found in any single square is four, and the maximum number from any single level is also four. Although the sample is small, the distributional pattern for the flint chips parallels that of other chipped stone refuse.

Comments Regarding Debris Materials

Stone debris materials at the site of El Inga include chips of obsidian, basalt, or flint, pebbles and stones. The pebbles are presumed to have no cultural importance in so far as the inhabitants were concerned and are believed to be present because of some natural agency.

The debris represents only a chipped stone technology, and there is no evidence for the grinding and polishing of stone. In fact, stones are very rare with only 11 being represented in a total of 78,878 collected specimens, and these show no indications of pecking, grinding, or polishing.

In chipped stone, obsidian is by far the most common material with basalt and flint representing a relatively small proportion of the total sample. All of the cultural materials appear to be most concentrated in a zone ranging from 8 to 16" in depth with a maximum number occurring in the upper part of this zone. The debris becomes less abundant both above and below this zone of concentration. The horizontal and vertical distributions of the various chips is essentially the same, suggesting that all materials were being worked by the same peoples at the same times.

The Artifacts

The artifacts found in the El Inga excavations present some difficulties in terms of classification which will become evident in the following discussion of the various objects. The vast majority of artifacts represented are specimens of chipped stone, primarily obsidian, although pottery sherds, one striated stone, and three pieces of hematite are present. Also, specimens such as primary burin spalls or secondary burin spalls are discussed along with the artifacts, whereas these objects might properly be considered as debris. They are included along with the artifacts, however, as they are believed to be of greater importance than random chip debris derived from the flaking process.

The various artifacts have been classified into groups or classes of objects which are believed to be meaningful for comparative purposes. It should be stressed, however, that this classification is not to be considered as final; other workers would probably classify some specimens differently, and additional research will certainly necessitate a reexamination and evaluation.

One difficulty in classifying the materials arises from the fact that many specimens are broken or incomplete; some broken fragments have

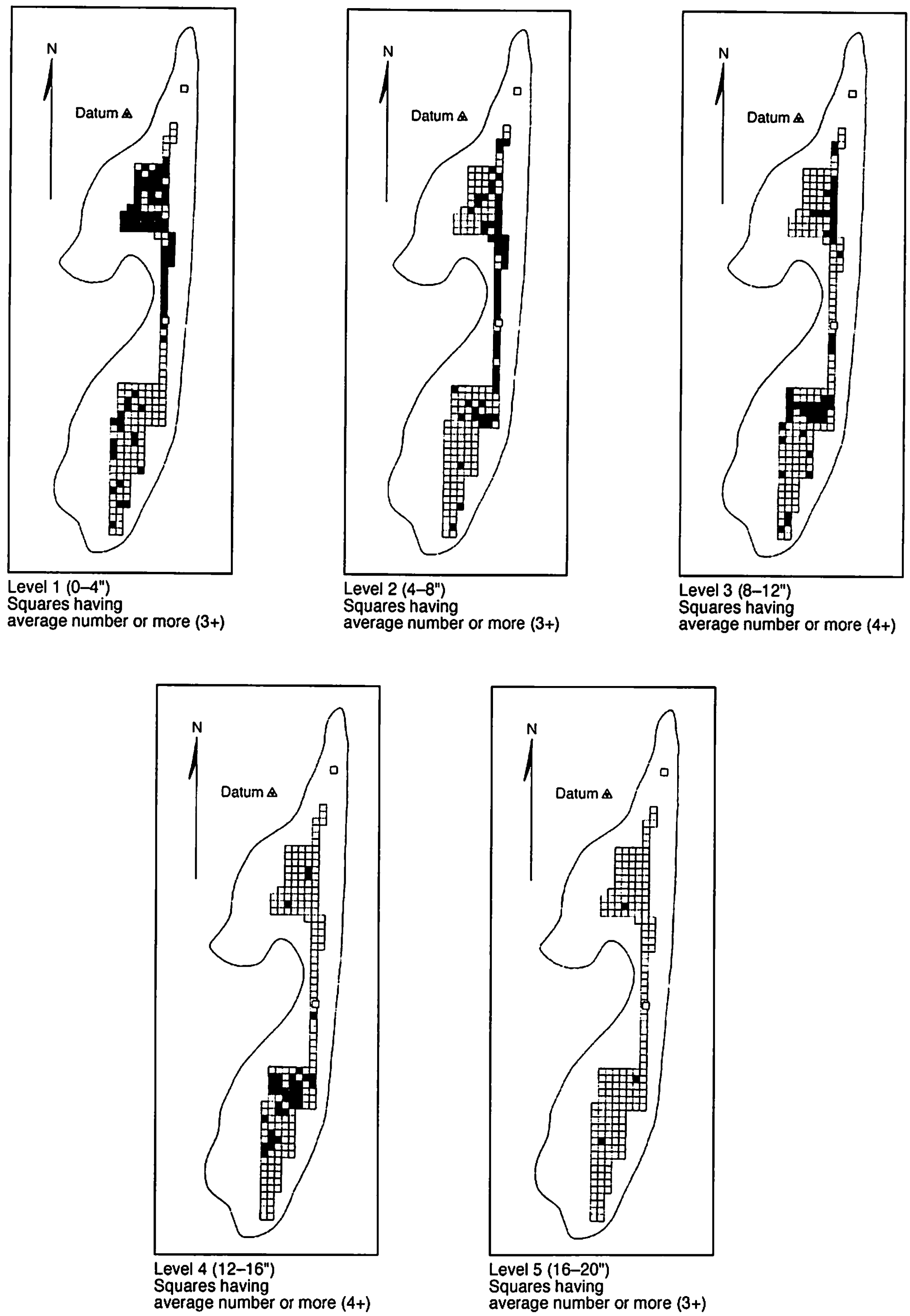


Figure 9. Distribution of basalt chip debris.

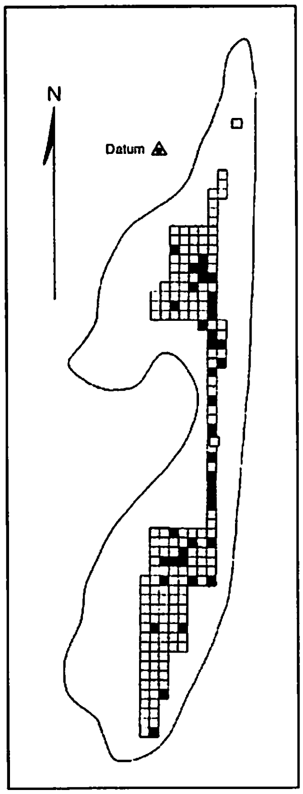


Figure 10. Flint chip distribution by squares.

been reworked to produce a different artifact. In addition, many items apparently served several purposes; for example, end scrapers often display one or more burin facets, or side scrapers have projections for perforating or graving.

A second difficulty arises from the fact that a number of the artifacts are of types that are not commonly found in archaeological sites with which the author is intimately familiar. A number of the specimens, such as burins, burin spalls, and retouched flakes, are more commonly found in European Upper Paleolithic context. The author's experience with this type of material is limited to small museum collections or illustrations in the literature, but this is not equal to first-hand field and laboratory experience gained from handling hundreds of specimens which include all kinds of variations. To help out in this matter, Dr. Jeremiah F. Epstein of the University of Texas examined a portion of the collections and pointed out the characteristics of certain types of artifacts, especially burins and burin spalls. Epstein's experience with Dr. Hallam L. Movius while working at Abri Pataud in France proved especially helpful in this regard. A limited number of specimens were also shown to Dr. James L. Giddings of Brown University for observation and comparisons with the Arctic Cape Denbigh materials which also contain burins, burin spalls and prismatic flakes. Dr. Junius Bird of the American Museum of Natural History in New York also examined a few specimens and offered comments regarding their similarity to materials from Fell's Cave in Chile. Mr. Masakaza Yoshizaki of the Hakodate Municipal Museum of Hokkaido, Japan, visiting at the University of Wisconsin, also examined the El Inga collections. Mr. Yoshizaki has been working with early obsidian complexes of northern Japan where blade and burin techniques are well known. Consequently, the El Inga material was of special interest to him. The observations of these persons have been very helpful in classifying the El Inga artifacts.

The specimens were first sorted into various classes such as projectile points, scrapers, burins, retouched flakes, etc. These were then reexamined to separate the various subdivisions within each class such as the various forms of projectile points or varieties of scrapers. Throughout this sorting process all specimens were carefully examined for evidence of wear or usage which would be helpful in classifying the object or in suggesting its former function. The glassy obsidian from which most of the artifacts were made is especially sensitive to scratch marks or abrasions caused from hafting or usage, and some artifacts display consistent patterns in worn surfaces.

Pottery Sherds

There is a total of 1711 pottery sherds from the excavations at El Inga. They have been grouped into two main classes, a prehistoric ware represented by reddish-tan colored sand tempered sherds, and a modern ware represented by glazed surface sherds. Both wares are believed to be limited to the plowed zone or cultivated section of the site as no specimens were ever observed "in situ" in the underlying compacted dark colored soils.

Glazed Pottery Sherds

There is a total of 43 pottery sherds exhibiting a glaze upon either one or both surfaces. They are certainly historic in origin and appear to be from cups, shallow bowls, saucers, or water jars. Most of the sherds are less than 2.0 cm square with the smallest one being less than 1.0 cm across and the largest one measuring 4.5 cm in its longest dimension. The thickness ranges from 0.4 to 1.0 cm with the average between 0.6 and 0.7 cm. A single basal sherd appears to be from a

Table 3. Vertical distribution of glazed pottery sherds.

Distribution	0 - 4"	4 - 8"	Total
Test pits	1	0	1
Main excavation	32	10	42
Total	33	10	43

ring-base bowl or saucer, and there are eight simple rim sherds. The glaze varies in color and a yellowish-tan, tan, shades of brown, green and greenish-blue are represented. Some examples show designs in two or three colors with the glaze paint applied rather carelessly in simple patterns. The larger sherds exhibit surface striations which suggest manufacture by the use of a potter's wheel rather than by hand. Similar glazed sherds may be found around present-day houses in the area, and similar wares can be bought in the village markets. The sherds do not have any relationship to the prehistoric occupation of the site, but are included here because they were found in the excavations. Table 3 gives the depth or vertical distribution of the glazed pottery sherds.

All of the glazed pottery sherds were found within the plowed zone of the site and have apparently become mixed with the prehistoric materials as a result of cultivation.

The glazed pottery sherds come from different parts of the site and are not limited to any specific area although occasionally pieces which may be from the same vessel were recovered from adjacent squares. The horizontal distribution, however, does not suggest a concentration in any special section of the site. Examples are presented in Figure 11.

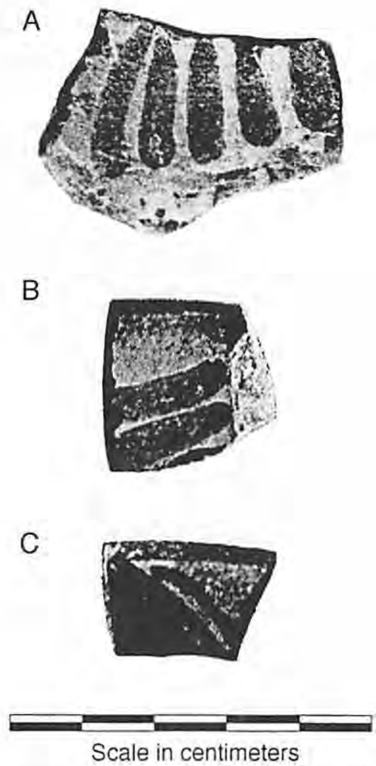


Figure 11. Glazed pottery sherds: (A) #497, from square S2-R1, depth 0 to 4"; (B) #379, from square S11-L5, depth 0 to 4"; (C) #467, from square S17-R2, depth 0 to 4".

Prehistoric Pottery Sherds

There is a total of 1668 pottery sherds which are believed to be mainly prehistoric. It is possible that some of these, however, could be from undecorated utility wares of modern manufacture, but the lack of detailed pottery studies for the area and the small size of the sherds make identification uncertain. This total number includes two decorated sherds and 30 small rim sherds.

The sherds are generally small in size and the total volume would not exceed two liters. The smallest sherds measure under 1.0 cm in diameter, and the largest sherd measures 4.8 cm in its longest dimension. Most of the sherds are 2.0 cm or less in diameter; the thickness ranges from 0.3 to 2.0 cm with the majority being between 0.6 and 0.8 cm.

The colors include various shades of gray, light tan, brown and red. The red or reddish-brown sherds have been painted or covered with a thin slip or wash. The surface finish varies from sherd to sherd, partly as a result of weathering and partly as a result of polishing the surface. Many sherds show smoothing or tool striations on the surface, some are unevenly smoothed, and others are polished. In general, the thicker and larger sherds tend to be less carefully made than the thinner and smaller sherds, perhaps reflecting the function or size of the original vessel.

The vessel shape is not indicated from the available sample, but sherd thickness suggests both large and small containers. The rim sherds are chiefly from simple round-lipped rims although three specimens indicate a slight outward flaring rim, and five specimens have a thickened and flattened lip.

The paste of the sherds feels quite sandy except on the polished surfaces, and it has been tempered with fine sand or volcanic ash. Often the paste is unevenly fired, showing bands of light and dark colors in cross section. There are no clear examples of coil fractures although some

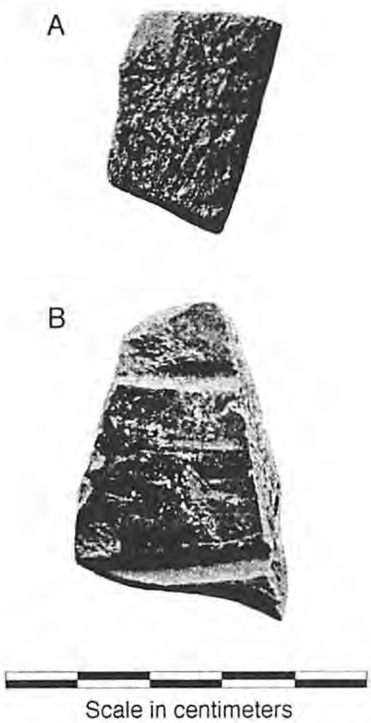


Figure 12. Prehistoric pottery sherds: (A) #39, from square S38-L1, depth 4 to 6"; (B) #251, from square S29-L2, depth 4 to 8".

rectangular sherds are broken in such a manner as to suggest a coiling technique.

Aside from the two decorated sherds, one other requires special mention. It is a small sherd exhibiting about one-third of a biconical perforation. This may be from a suspension hole, from a repair hole for lashing a cracked vessel, or the sherd may be from some unidentified object. The sherd is too small and broken for one to be certain. One decorated sherd is a polished red slipped ware having two trailed lines extending across the surface. The trailing is a shallow rounded groove between 0.3 and 0.4 cm in width and 0.1 cm in depth (Fig. 12). The second decorated sherd has been decorated by several incised lines cut into the surface of the vessel (Fig. 12). No other sherds appear to merit special mention.

The pottery was found in all sections of the site although not all squares produced samples. Out of the total of 193 squares, four squares lacked pottery. The largest number of sherds found in any single square was 32 specimens. The vertical distribution of the pottery sherds is given in Table 4.

The pottery sherds are concentrated in level 1 (0 to 4") although a large number are to be found in level 2 (4 to 8"). This is certainly to be expected because of cultivation and the presence of modern glazed sherds within these levels. Discounting the test pits, there are 34 sherds from level 3 (8 to 12") and one sherd from level 4 (12 to 16"). The deeper sherds from the test pits came from Test Pit 3, which contained an extra mantle of wind blown sand upon its surface so that the various levels are not stratigraphically equivalent to the main area of excavation. In the main area of excavation, with the exception of one sherd, the sherds from level 3 are all from the south section of the excavation in the area where the plowed zone extended to the greatest depth (Fig. 13). In this area the removal of two levels did not always clear the plowed zone, and the upper part of level 3 sometimes contained remnants of this plowed zone. It is believed that sherds found in level 3 represent sherds that are to be associated with this zone at the site. The single sherd from level 4 is too deep for the plowed zone, and its presence at this level is not understood. It is suspected that this sherd is one which was placed in the wrong sack by one of the workmen, possibly having been collected from the surface or from an adjacent square. It came from square S11-L4, which contains no pottery in either levels 2 or 3 and which are located in the northern section of the site. With this single exception, there are no sherds lower than level 2 in this area of the excavation.

The horizontal distribution of the pottery sherds (Fig. 13) indicates a heavier concentration in the southern section of the excavation, especially between S35 and S45. It is also in this area that level 3 sherds are concentrated. The fact that this sector is still under cultivation may be responsible for the greater number of sherds.

Hematite

There are three small pieces of hematite from

Table 4. Vertical distribution of prehistoric pottery sherds

Distribution	0 to 4"	4 to 8"	8 to 12"	12 to 16"	Total
Test Pits	17	6	8	4	35
Main excavation	1161	437	34	1	1633
Total	1178	443	42	5	1668

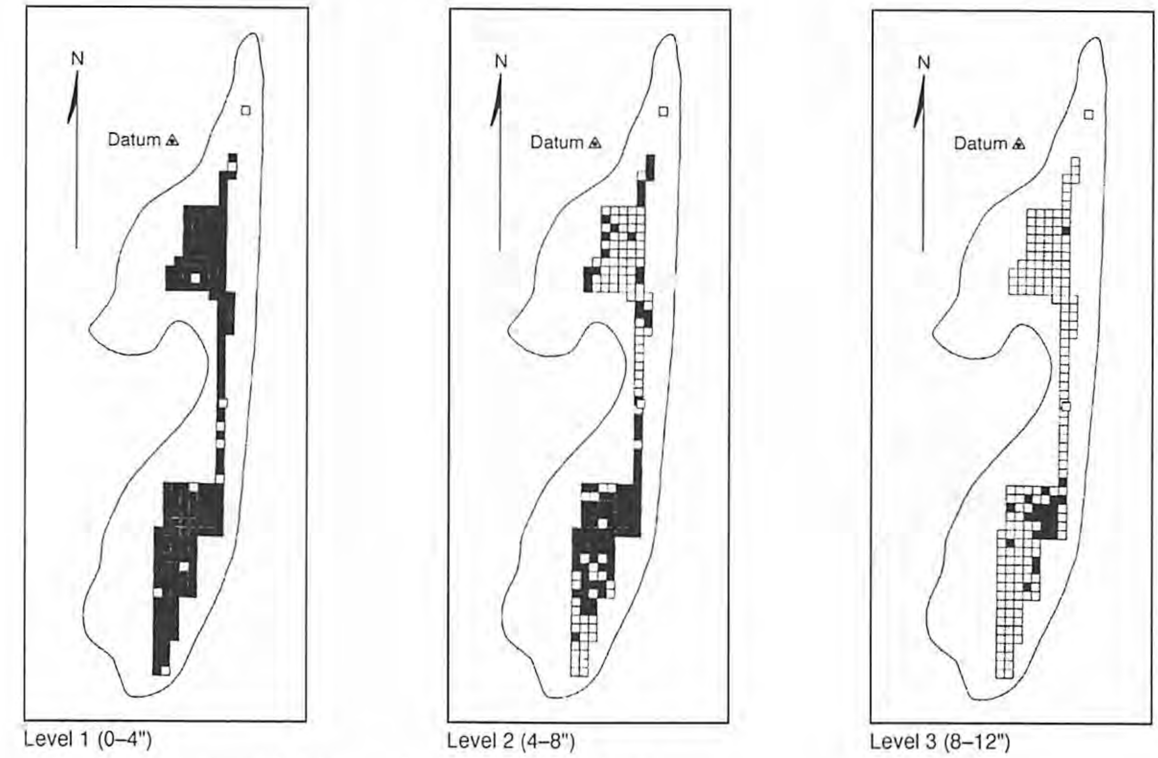


Figure 13. Horizontal distribution of prehistoric pottery sherds.

El Inga. The largest specimen measures 0.9 by 1.4 by 1.9 cm, and the other two pieces are slightly smaller in size. They are not marked by evidence of grinding or striations to indicate their use as raw material for pigment, but each specimen will produce a bright red color when marked upon a streak plate. One specimen came from square S25-Rl at a depth between 4 and 8", and the other two came from square S13-L4 at a depth between 12 and 16". Although they exhibit no evidence of use, the material was certainly carried to the site by the early inhabitants. Although rare and of questionable use, it is believed that the hematite should be included in the cultural inventory of the El Inga complex.

Striated Stone

One small stone measuring 7.1 by 4.2 by 3.5 cm has a number of shallow striations or grooves cut into the surface, apparently from use as an abrader. The specimen was found in Stratigraphic Block #3 at a depth of 8 to 10" below the surface. At first it was thought that the grooved appearance might have resulted from differential weathering, but this is not the case as the striations cut across contained crystals and matrix of the pebble which is apparently volcanic in origin. This would not weather in the manner indicated but has been altered by use as a tool by the inhabitants of the site. The grooves vary slightly in width as well as depth and appear to have been produced by rubbing against a sharp edge of hard material (Fig. 14). Possibly this stone was used to grind the stem edges on projectile points or other artifacts found at the site.

Figure 14. #212, grooved or striated stone, from square S11-L1, depth 8 to 10".

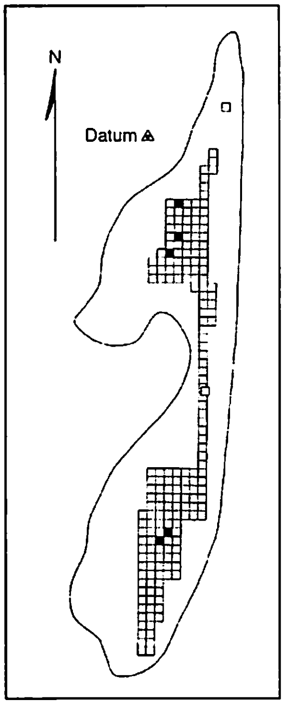


Figure 15. Distribution of chip caches by square.

Chip Caches

There are six chip caches from the excavation. These are represented by clusters of chips and flakes that were found within a limited area of the site, usually less than 12" in diameter. It is not clear whether these deposits of chips were intentional caches of chips placed in these spots by the inhabitants, or if they merely were an accidental result from artifact manufacture. The surrounding soil gave no indication of the cache having resulted from debris collecting in an animal burrow or within a pocket of an irregular surface where it became trapped by an erosional process.

Many of the flakes could serve as knives or as raw material for the manufacture of smaller artifacts; other chips are so small as to appear worthless even though the obsidian had obviously been transported to the site. Thus, the importance of these chip caches to the inhabitants remains unsettled and uncertain.

Five of the chip caches came from the main area of excavation (Fig. 15), and one was found in Test Pit 2A. Three caches came from the northern sector of the main grid, and two came from the southern section. Three of them came from level 4 (12 to 16") which is also a zone of abundant chip debris.

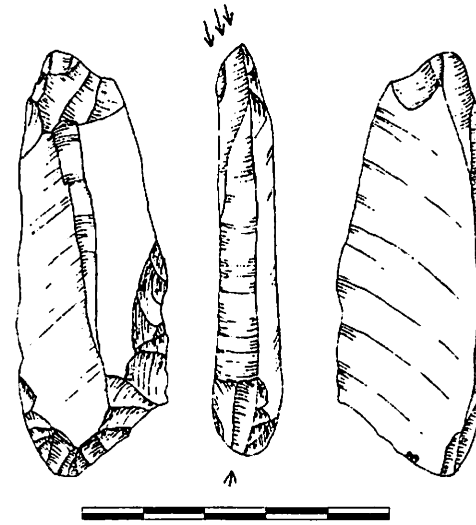


Figure 16. Cache #864: three views of a scraper showing burin facets.

Chip Cache #864

One chip cache containing 65 obsidian chips was found in square S4-L2 in the second level (4 to 8"). It appeared as a lens of chips about 6" in diameter in the northeast quarter of the square. The cache contains 64 chips of obsidian and one artifact. The chips range in size from less than 1.0 cm to a maximum length of 4.7 cm. The single artifact (Fig. 16) appears to be a scraper that has been modified by conversion to a burin at one end.

Chip Cache #865

This cache, containing 301 obsidian chips and three fragments of artifacts, was found in square S10-L3 in level 2 (4 to 8"). The chips were concentrated within the center portion of the southwest quarter of the level. The obsidian chips range in size from 0.5 to 4.9 cm, but many of them are less than 1.0 cm in size, and it is difficult to believe that they would have been of much value to the owner as raw material.

The three artifacts are illustrated in Figure 17. One is a small flake that has been used as a scraper along one edge, and the other two are fragments of larger scrapers exhibiting more careful preparation and shaping.

Chip Cache #856

A chip cache containing 60 obsidian flakes was found in square S44-L4 at a depth of 14" in the approximate center of the square. The cache contains 59 obsidian chips ranging in size from

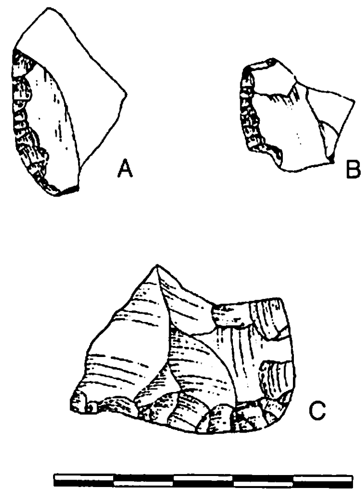


Figure 17. Cache #865: (A and B) fragments of flake scrapers; (C) fragment of a thick well-made scraper.

0.6 to 7.5 cm in length. One obsidian flake shows evidence of having been used as a knife or scraping tool along one edge (Fig. 18). A number of the other flakes would serve equally well as knives but exhibit no secondary chipping.

Chip Cache #863

An obsidian chip cache was found in the southwest quarter of square S8-L2 at a depth of 14" below the surface. The cache includes 216 obsidian flakes ranging in size from 0.9 to 4.4 cm. There are four pieces which represent broken artifacts; all are scrapers showing secondary flaking along one edge (Fig. 19).

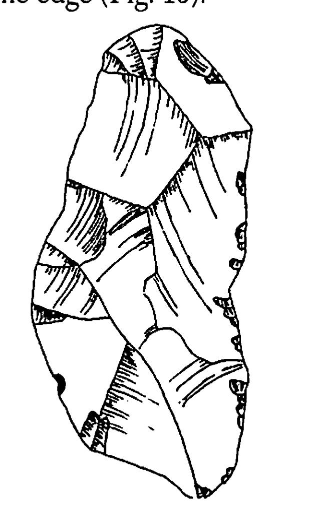


Figure 18. Cache #856: flake showing evidence of use as a knife or scraper.

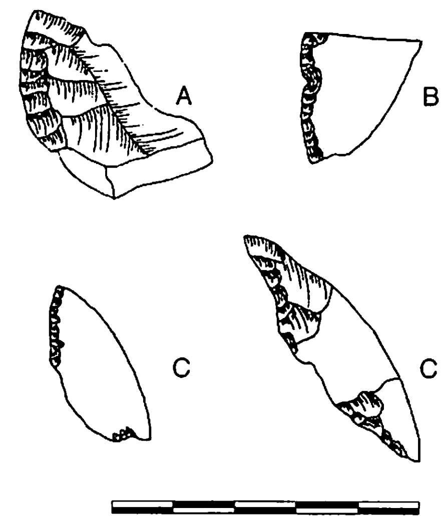


Figure 19. Cache #863: (A and D) fragments of thick scrapers; (B and C) fragments of flake scrapers.

Chip Cache #679

A small obsidian chip cache was found in the northwest quarter of square S43-L3 at a depth of 14". It contains a total of 38 pieces, 1 artifact, and 37 flakes. The flakes range in size from 0.6 to 4.5 cm. There is one secondary burin spall which shows evidence of having been used as a scraper at one end (Fig. 20).

Chip Cache #505

One chip cache was found in Test Pit 2A in level 3 (8 to 12"). It contains 271 items, including 9 artifacts and 262 chips. There are two chips of basalt, but all the rest are of obsidian ranging from 0.8 to 5.3 cm in maximum length.

The artifacts include 2 primary burin spalls, 1 secondary burin spall, 4 flakes with retouched

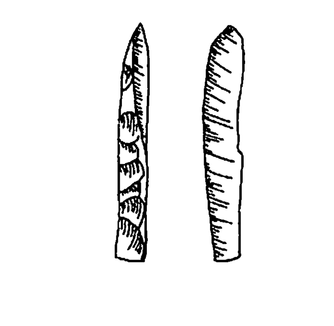


Figure 20. Cache #679: two views of a burin spall.

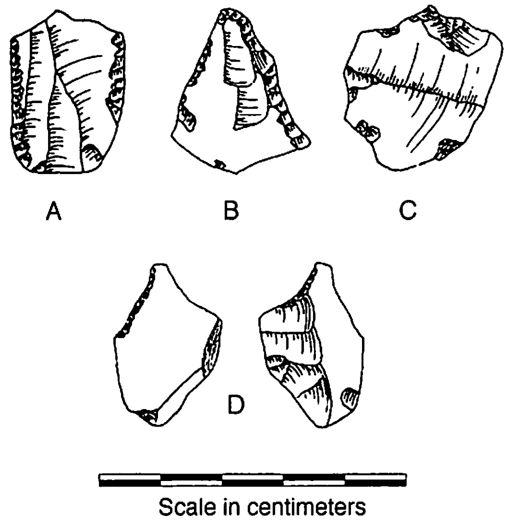


Figure 21. Cache #505: (A and B) fragments of flake scrapers; (C) possible pointed graver or perforator; (D) two views of a chisel-graver or reamer.

edges suggesting scrapers, and 2 unidentified objects. Of these last two, one specimen has retouching along the sides to produce a small projection which would serve as an engraving tool; the other has a projecting "screwdriver"-like tip which could serve as a graver or reamer type implement (Fig. 21).

Projectile Points

Projectile points are represented by a small number of complete specimens and a number of broken fragments. The total of objects classed as projectile points or fragments from projectile points numbers 122 specimens. It must be admitted that some of these, especially fragments, could represent knives rather than projectile points.

Of the total number, 74 specimens are fragments which cannot be identified with any specific form or recognizable style because distinctive parts are missing. The remaining 48 specimens are more complete or have characteristics which help in their identification. Of this latter group, 21 specimens are very much alike and appear to represent a distinctive type, the Fell's Cave Fish-tail point; the remaining 27 specimens include several forms which probably represent additional different types. The total sample is so small, however, that the limits of variation are not detectable, and consequently all of the specimens are illustrated.

Table 5 shows the distribution of the various points according to depth at the site. Each specimen is indicated by the catalog number which is also identified in the illustrations.

Fell's Cave Fish-tail Points

A stemmed projectile point resembling those found by Bird (1946) at Fell's Cave is the most typical type found at El Inga. There are 21 examples of this type that can be identified, chiefly from the distinctive base, and, of these, only two are complete specimens. All of them are illustrated in Figures 22 and 23. In most cases the rectangular concave based stems are fluted or basally thinned by smaller flakes, and the edges of the stem have been ground smooth. Some of the specimens appear to have been made from thin flakes which permitted a minimum amount of chipping to shape the point.

In horizontal distribution, this type is most abundant in the northern section of the excavation, only three examples having been found in the southern section (Fig. 24). The distribution according to depth from the surface is shown in the preceding table. The maximum number of four occurs in level 4 (12 to 16") although specimens were found in all levels of the excavation.

Other Projectile Points

Of the remaining 27 projectile points there are some which appear to represent the same type while other forms are represented by single examples. There are seven specimens which are included as a stemmed form in which the stem tapers toward the base (Fig. 26A–G). The stem is relatively narrow with a rounded base, and the shoulders are prominent. Only three specimens are clearly represented, but there are four stems (Fig. 26D–G) which are believed to be broken from this type. In two of these broken stems, the

Table 5. Vertical distribution of El Inga projectile points (specimens indicated by catalog numbers). * Indicates surface find.

Depth	Fell's Cave Fish-tail	Contracting stem	Broad-stem	Ovate	Barbed	Unique
0 to 4"	#9*, #92a, #92b, #302		#15		#45, #247	
4 to 8"	#5, #309, #682a, #682b	#356	#4, #334	#86		
8 to 12"	#3, #10, #58a, #58b	#120, #143, #609, #825	#7, #95, #152, #399	#11, #298		#227
12 to 16"	#44a, #71, #91, #354	#74, #113	#44b, #154	#155	#12	#124
16 to 20"	#18, #17, #118		#337	#60		
20 to 24"	#14, #122					

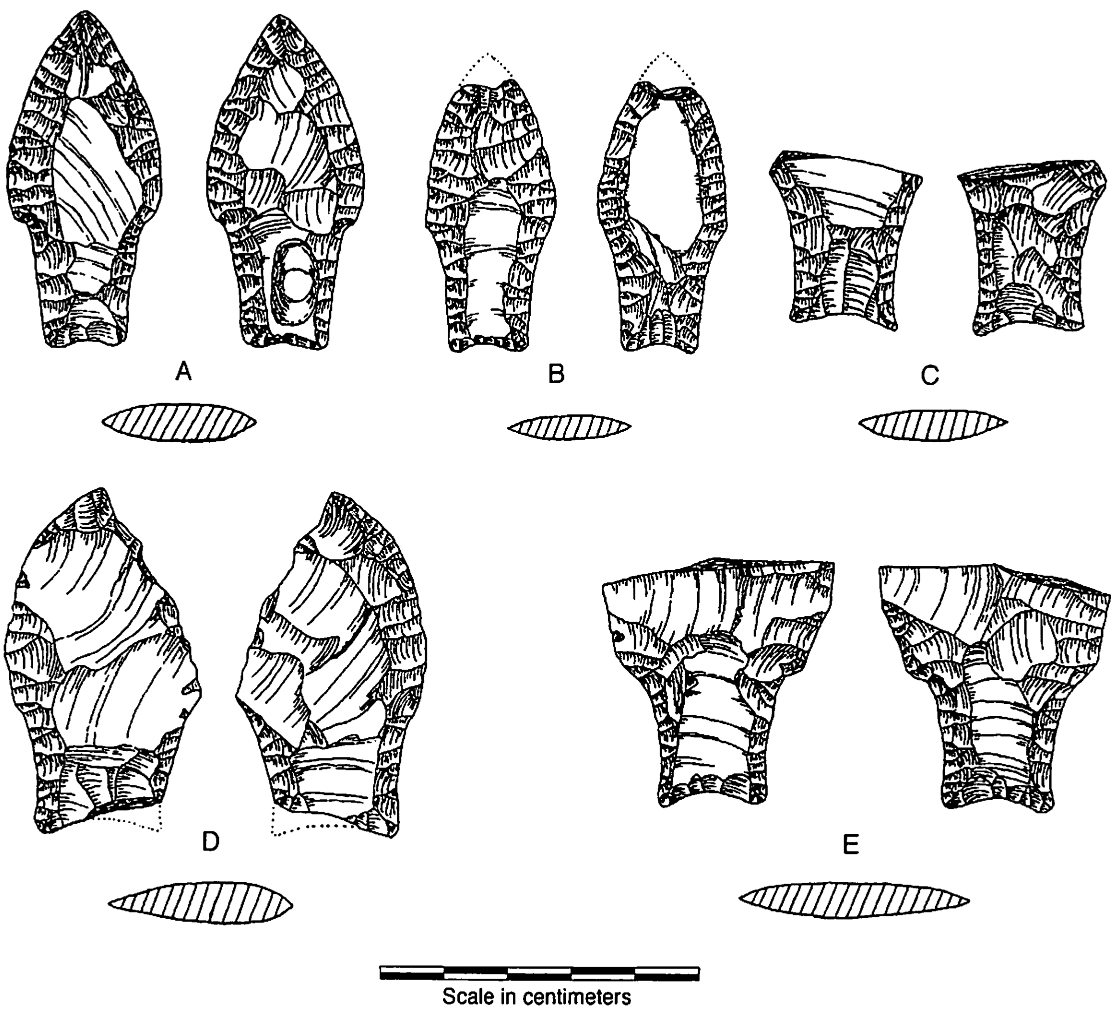


Figure 22. Fell's Cave Fish-tail points: (A) #14, dark brown flint or chert, thermal flake scar on stem, from square S12-L1, depth 20 to 22"; (B) #3, obsidian, fluted on one face, made from thin flake, point tip damaged at time of discovery, ground stem edges, from square S39-R1, depth 8 to 12"; (C) #92a, obsidian, basal thinning, made from flake, ground stem edges, from square S22-R1, depth 0 to 4"; (D) #71, obsidian, fluted on one face, blade appears to have been reworked, ground stem edges, from square S12-L1, depth 16"; (E) #5, obsidian, fluted on both faces, ground stem edges, from square S12-L3, depth 8".

sides are parallel, but these are believed to be broken from points of this general stemmed form.

This contracting stemmed type was found in both sections of the site, four being found in the northern section of the excavation, and three being found in the southern section (Fig. 25). In terms of depth, they all came from between 4 and 16" with four specimens appearing in level 3 (8 to 12").

There are 10 specimens which differ from those mentioned above and are tentatively grouped under the term broad-stemmed points. All of these are illustrated in Figure 27A–J, and it is believed that Figures 27A and E can be considered as typical examples. It is also possible that these latter two specimens are merely variants of the Fell's Cave Fish-tail type. The remaining forms exhibit considerable variation or have been modified by reworking in some manner. The distribution of these broad-stemmed points by square is shown in Figure 28. Seven examples were found in the northern section of the excavation, and three were found in the southern section. The vertical distribution is shown in Table 5. The maximum number of four specimens came from a depth between 8 and 12".

There are five ovate or leaf-shaped projectile points (Fig. 31A–E). Although these are consid-

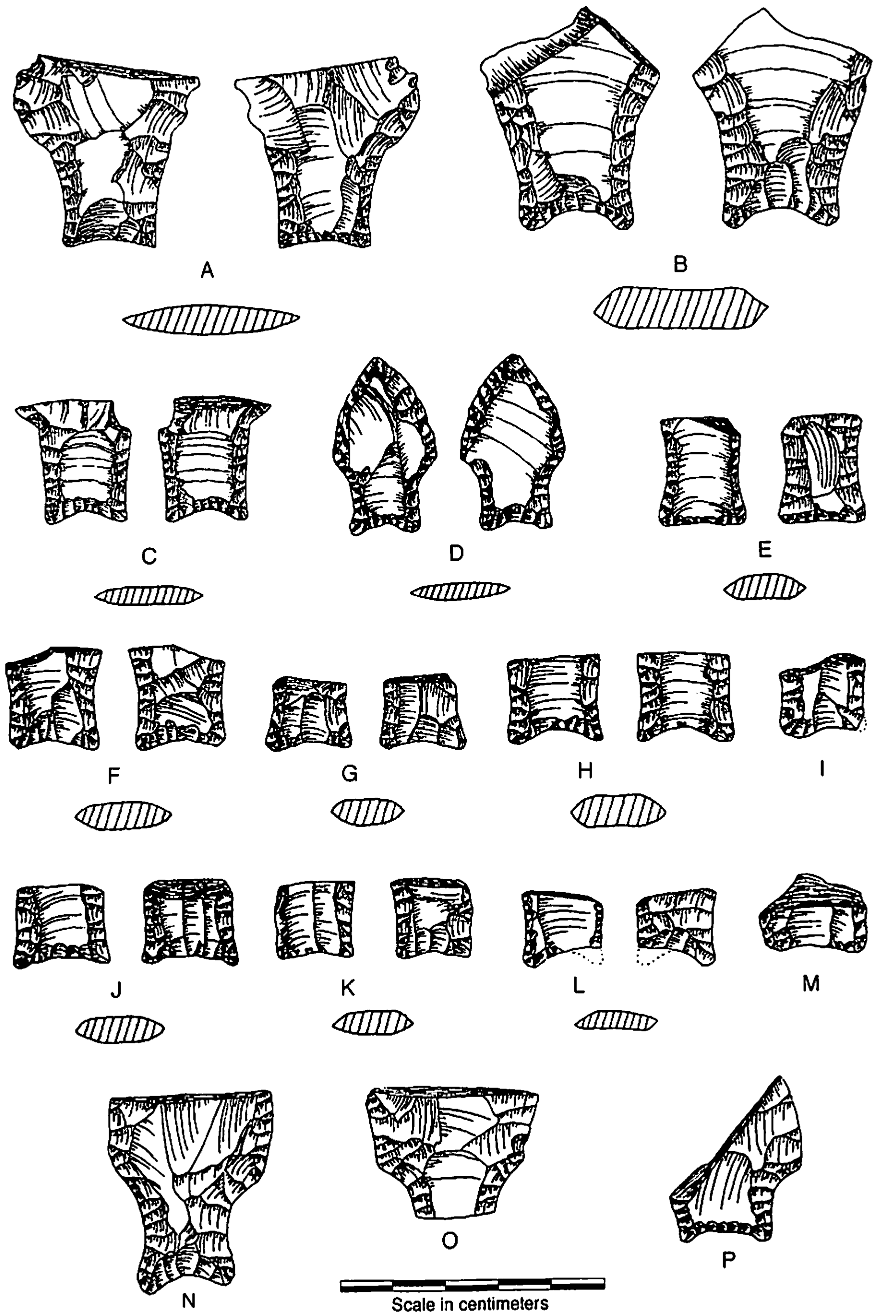


Figure 23. Fell's Cave Fish-tail points: (A) #58a, obsidian, fluted on one face, ground stem edges, from square S13-R1, depth 8 to 12"; (B) #17, obsidian, fluted on both faces, ground stem edges, from square S11-L2, depth 17"; (C) #9, obsidian, fluted on both faces, ground stem edges, found on the surface; (D) #18, obsidian, made from flake, from square S11-L0, depth 18"; (E) #91, obsidian, fluted on one side, ground stem edges, from square S4-R1, depth 12 to 16"; (F) #122, obsidian, basal thinning, ground stem edges, from square S12-L2, depth 23.5"; (G) #682a, obsidian, basal thinning, slightly ground stem edges, from square S4-L3, depth 4 to 8"; (H) #92b, obsidian, fluted on both faces, ground stem edges, from square S22-R1, depth 0 to 4"; (I) #682b, obsidian, basal thinning, ground stem edges, from square S4-L3, depth 4 to 8"; (J) #354, obsidian, fluted on one face, ground stem edges, from square S8-L0, depth 12 to 16"; (K) #309, obsidian, basal thinning, ground stem edges, from square S15-R1, depth 4 to 8"; (L) #302, obsidian, fluted on one face, slightly ground stem edge, from square S20-R1, depth 0 to 4"; (M) #44a, obsidian basal thinning, slightly ground stem edges, from square S38-L1, depth 12 to 14"; (N) #10, obsidian, Fell's Cave variant, ground stem edges, from square S12-R1, depth 8 to 12"; (O) #118, obsidian, base has been broken off, made from flake, ground stem edges, from square S11-L0, depth 16 to 20"; (P) #58b, obsidian, reworked, base has been broken off and reworked, ground stem edges, from square S13-R1, depth 8 to 12".

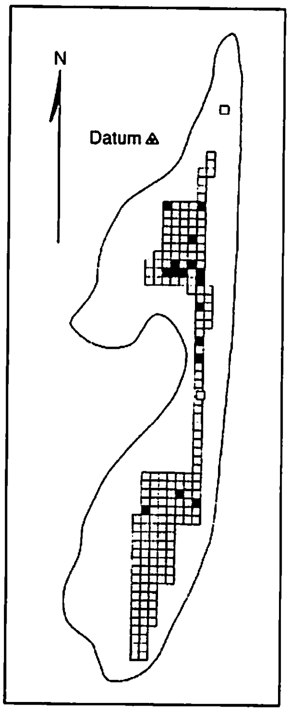


Figure 24. Distribution of Fell's Cave Fish-tail points by square.

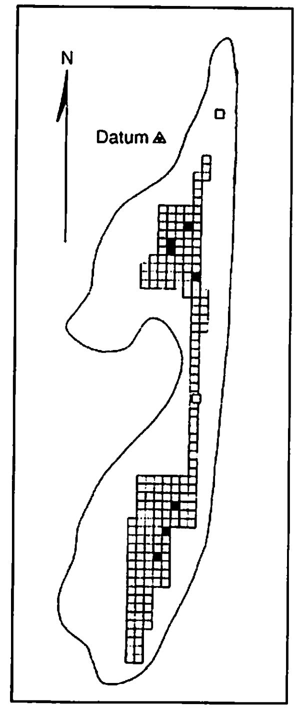


Figure 25. Distribution of contracting stemmed points by square.

ered as projectile points, they could have served equally well as knives. Three specimens are medium in size and appear to have a distinctive basal portion which is roughly triangular in outline. One specimen is considerably larger than the other four and perhaps should be differentiated because of its larger size. It is, however, the only example of this large size with the possible exception of some fragments. One of the five specimens is quite small and has more rounded

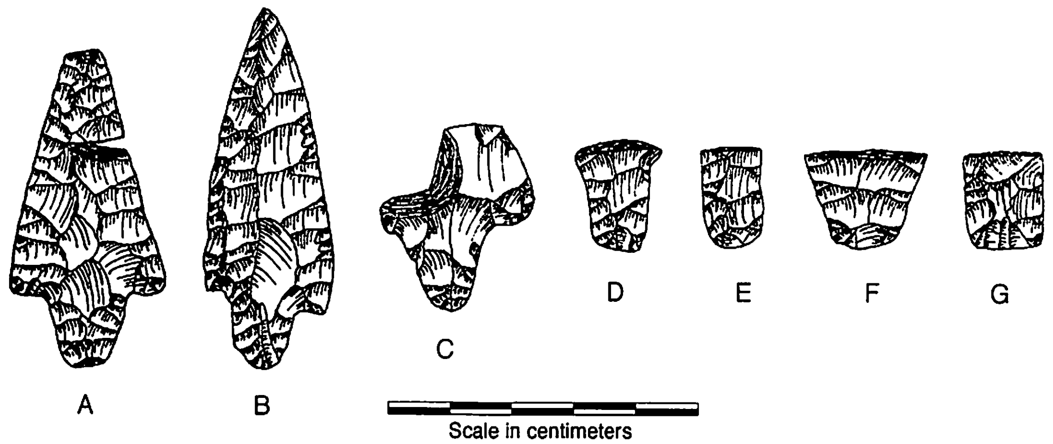


Figure 26. Contracting stemmed points: (A) #703 and #113, broken when found but matched together in the laboratory, obsidian, no grinding (#703 [tip], from square S46-L3, depth 12 to 16"; #113 [basal section], from square S45-L3, depth 14"); (B) #120, obsidian, no grinding, from square S8-L2, depth 10"; (C) #825, obsidian, no grinding, broken in excavation, made from flake, from square S9-L2, depth 8 to 12"; (D) #356, obsidian, probably stem from stemmed point similar to items A to C, no grinding, from square S12-R1, depth 4 to 8"; (E) #143, obsidian, probably stem from stemmed point similar to items A to C, slight grinding, from square S6-L0, depth 10 to 12"; (F) #609, obsidian, probably stem from stemmed point similar to items A to C, ground stem edges, from square S39-L1, depth 8 to 12"; (G) #74, obsidian, possibly stem from stemmed point similar to items A to C, ground stem edges, from square S42-L2, depth 15".

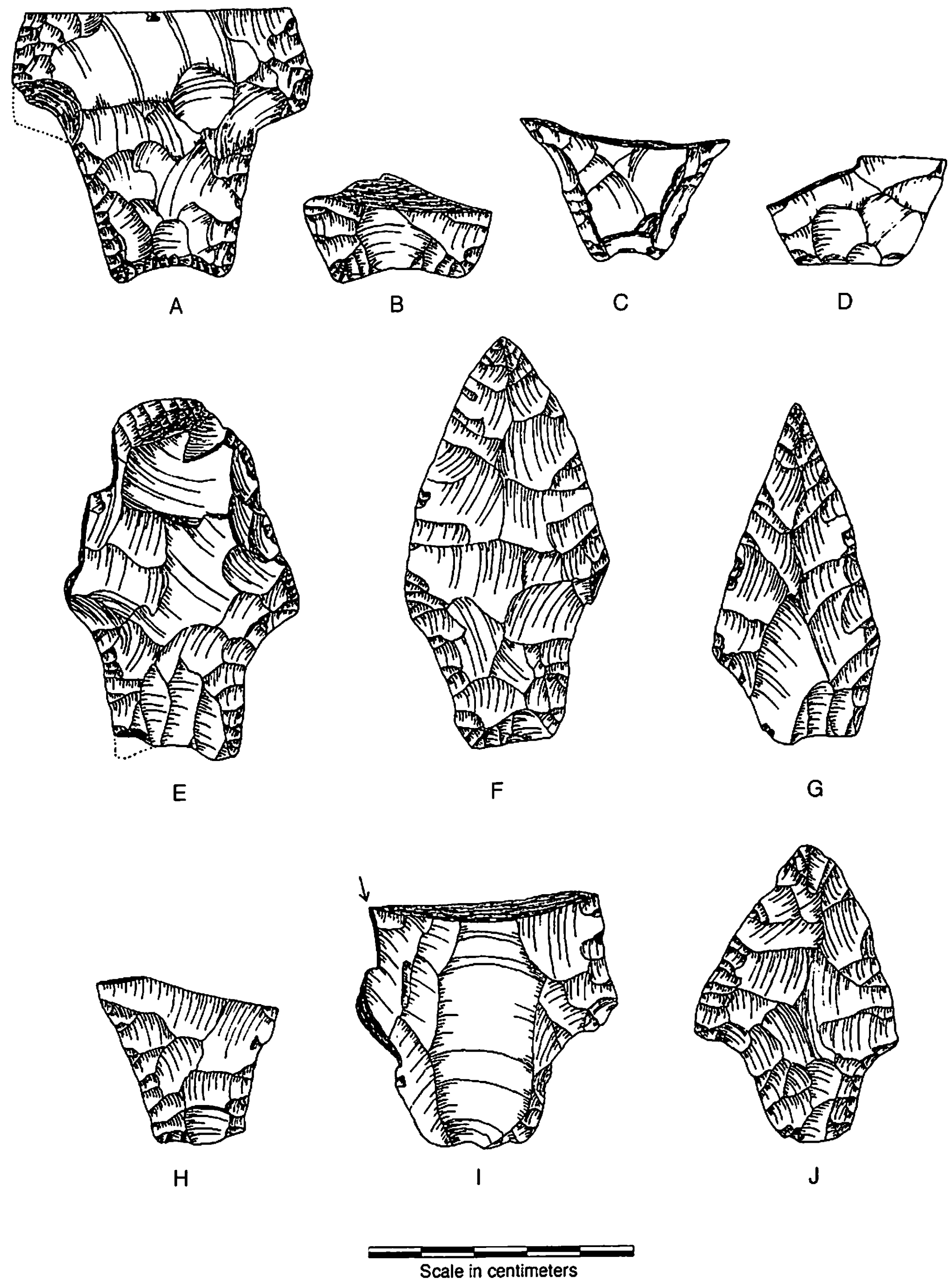


Figure 27. Broad-stemmed points: (A) #95, obsidian, ground stem edges, from square S7-L1, depth 12"; (B) #399, obsidian, stem base from type shown in A, ground stem edges, from square S9-L0, depth 8 to 12"; (C) #44b, basalt, thick and somewhat crude, from square S38-L1, depth 12 to 14"; (D) #334, basalt, possibly from broad-stemmed form or lanceolate type, ground stem edges and base, from square S9-L1, depth 4 to 8"; (E) #154, obsidian, tip and blade damaged apparently from impact fracture, ground stem edges, from square S40-L5, depth 12 to 16"; (F) #15, obsidian, slightly ground stem edges, from square S11-L3, depth 2"; (G) #4, obsidian, thinness of tip and symmetrical form suggest that this specimen may have been reworked from larger specimen, slightly ground stem edges, from square S10-L2, depth 6"; (H) #337, obsidian, base appears to be reworked, this specimen may be from the Fell's Cave Fish-tail type in which original base has been broken off, from square S9-L1, depth 16 to 20"; (I) #7, obsidian, burin blow on a break, from square S41-L0, depth 8 to 12"; (J) #152, obsidian, thinness of stem suggests that this may have been made from a broken point which was reshaped to produce stem, from square S7-L0, depth 10".

basal section, perhaps indicating another variation in type. Four of the ovate specimens came from the southern section of the excavation while only one was found toward the north end (Fig. 30). This distribution is unlike that of the other projectile points and may be of cultural significance. The distribution according to depth (Table 5), however, does not show concentration in any particular zone.

Finally, there are three specimens, all broken, that are from projectile points having a barbed shoulder. The stems are all broken, and the complete outlines remain unknown (Fig. 32). Possibly they are examples of the contracting stemmed forms mentioned earlier. They are from various parts of the site (Fig. 33), with two specimens representing level 1 (0" to 4") (Table 5).

Projectile-point Fragments

There is a total of 74 specimens which are classed as fragments from projectile points. Selected examples are illustrated in Figures 35 and 36. It is quite possible that some of these specimens are broken from knives which have been flaked on both surfaces. These specimens are represented chiefly by points, midsections, or fragments including a shoulder area; they also have somewhat better workmanship than items classed as knife fragments.

Three specimens are made of basalt while the remaining 71 pieces are made of obsidian. The horizontal distribution of projectile point fragments throughout the excavated area is shown in Figure 34. The distribution according to depth is shown in Table 6.

Knives

There is a total of 276 items classed as knives from the El Inga excavations. These include three varieties represented as follows: one hafted knife, 145 bifacially flaked knives, and 130 flake knives. Their distribution according to depth is shown in Table 7.

Table 6. Vertical distribution of projectile-point fragments

Depth in inches	Point fragments
0 to 4	10
4 to 8	16
8 to 12	16
12 to 16	20
16 to 20	8
20 to 24	4
Total	74

Table 7. Vertical distribution of knives.

Depth in inches	Hafted stem	Bifacial	Flake
0 to 4	0	19	7
4 to 8	0	20	24
8 to 12	0	37	45
12 to 16	1	33	51
16 to 20	0	31	2
20 to 24	0	5	1
Total	1	145	130

A single specimen made from a thin obsidian flake has a stem for hafting (Fig. 37). This is especially interesting as the stem is similar in form to the Fell's Cave Fish-tail projectile points. It is not clear as to whether the specimen is damaged and incomplete, or whether the stem was chipped at one end of an irregular flake. The possibility that this specimen might represent an unfinished projectile point has been considered but was rejected. The thinness of the flake and slight retouching along the cutting edge suggest a hafted knife.

There are 145 specimens classed as knives which exhibit chipping upon both faces of the artifact. Only seven specimens are complete (Fig. 38) with the vast majority of examples being represented by fragments. Examples of broken specimens are illustrated in Figures 39 and 40.

All of the bifacially flaked knives are made of obsidian, and the workmanship is not generally as good as that present on the projectile points. The knives are roughly ovate in outline and are often irregular or asymmetrical perhaps reflecting the form of the obsidian flake from which the specimen was made. Some fragments (Fig. 39 I and L) indicate that considerable variation in the knife forms exist, but unbroken specimens are not available.

The bifacial knives are found in all sections of the site and in all levels of the excavation. The horizontal distribution by levels is shown in Figure 41.

There are 130 specimens classed as flake knives or blade-like knives. These are represented by relatively thin and narrow flakes which could serve as a useful cutting tool. Examples of flake knives are illustrated in Figures 42 and 43. It is quite possible, of course, that some objects classed as flake knives represent merely chipping debris or that flakes included with obsidian debris were actually used for knives. Items classed as flake knives are thin, generally relatively long and narrow approaching a blade-like form.

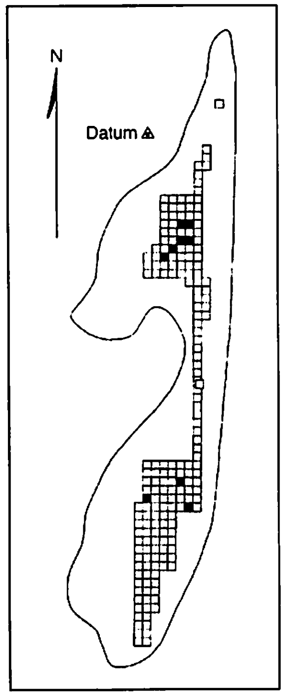


Figure 28. Distribution of broad-stemmed points by squares.

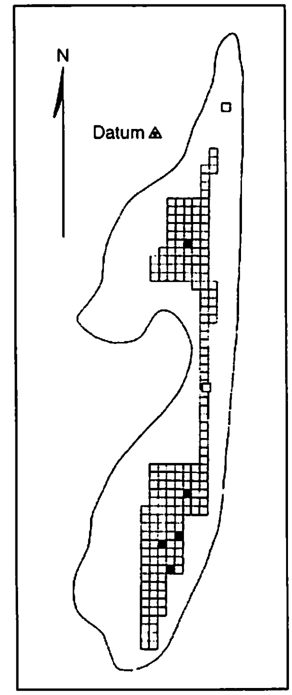


Figure 30. Distribution of ovate or leaf-shaped points by squares.

Some of these specimens would be termed blades by other archaeologists, but I am reserving the term blade for a more restricted category of artifacts. Unfortunately, the term blade is not carefully used and has been applied to a wide variety of objects including relatively narrow flakes, parallel sided flakes, lamellar flakes, and even bifacially chipped items such as knives or harpoon sideblades. I would prefer to reserve the term blade for relatively thin, long and narrow flakes that have been intentionally produced from a specially prepared core. In this case the blades

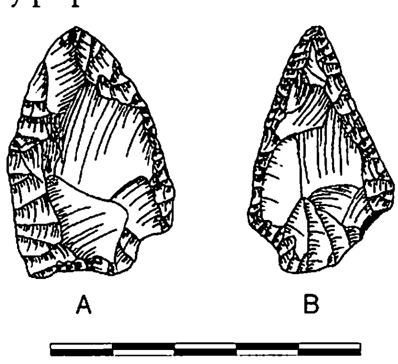


Figure 29. Unique points: (A) #124, obsidian, possibly reworked, unique, from square S12-L1, depth 15.5"; (B) #227, obsidian, shoulder and base damaged, unique, from square S11-L2, depth 10 to 12".

are flat on one face and faceted on the other, with all flake scars having their point of origin at one end of the blade. The manufacture of such blades, upon removal from the core, leaves a faceted or polyhedral core showing the surfaces from which the blades were removed. Examples of such blades together with their faceted cores are to be found in the Hopewell assemblage of the Ohio Valley and in the various cultures of the Valley of Mexico.

The specimens found at El Inga do not appear to meet the above requirements for blades and are not like those from the Ohio Valley or the Valley of Mexico. They appear to be random blade-like flakes that were accidentally produced by a less specialized chipping process. The general absence of faceted cores and the small number of blade-like flakes within the large sample of chip debris support this conclusion.

The inhabitants of El Inga, however, were not ignorant of the techniques necessary to produce blades. The removal of the flute at the base of the Fell's Cave Fish-tail projectile point or the removal of a secondary burin spall requires this ability. The production of blades as an end product, however, does not appear to be one of their characteristics.

The flake knives or blade-like knives from El

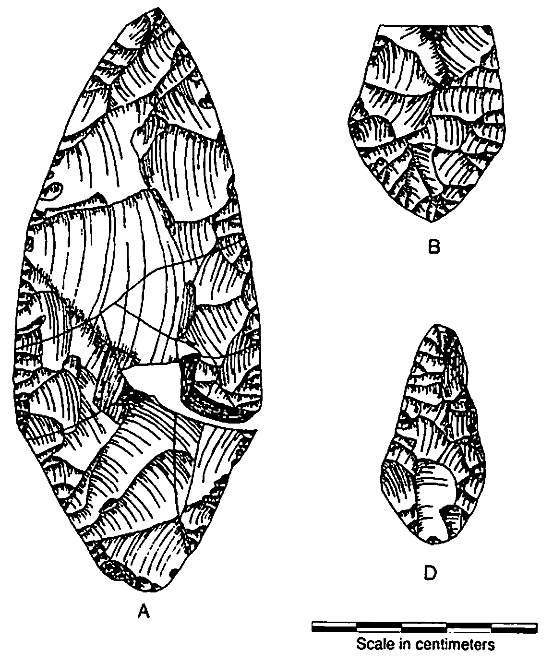


Figure 31. Ovate or leaf-shaped projectile points: (A) #86, obsidian, broken in seven pieces in the field, from square S9-L1, depth 6"; (B) #11, obsidian, from square S48-L3, depth 12"; (C) #298, obsidian, from square S44-L2, depth 8 to 12"; (D) #155, obsidian, slight twist to the blade, from square S45-L4, depth 12 to 16"; (E) #60, basalt, from square S39-L1, depth 16 to 20".

Inga occur in all parts of the site and within the various levels. Their horizontal distribution according to the various levels is shown in Figure 44. All specimens are flaked of obsidian except for two examples, one of flint and one of basalt.

Scrapers

Scrapers represent one of the most common artifacts found at the El Inga excavations. There is a total of 849 specimens that have been classified as scrapers; of these, 815 are made of obsidian, 24 are of basalt, and 10 are of flint. This number includes not only complete specimens, but fragments or broken pieces.

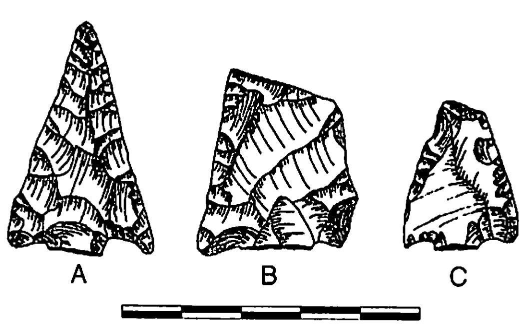


Figure 32. Barbed shouldered points: (A) #12, obsidian, made from thin flake, stem broken off, from square S52-L6, depth 12 to 16"; (B) #45, obsidian, stem broken off, from square S4-L0, depth 0 to 4"; (C) #247, obsidian, made from flake, stem broken off, from square S14-R1, depth 0 to 4".

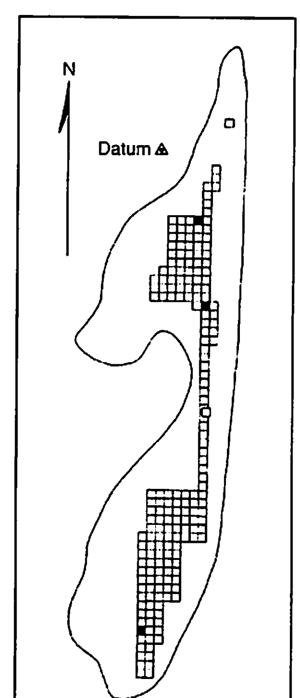


Figure 33. Distribution of barbed points by squares.

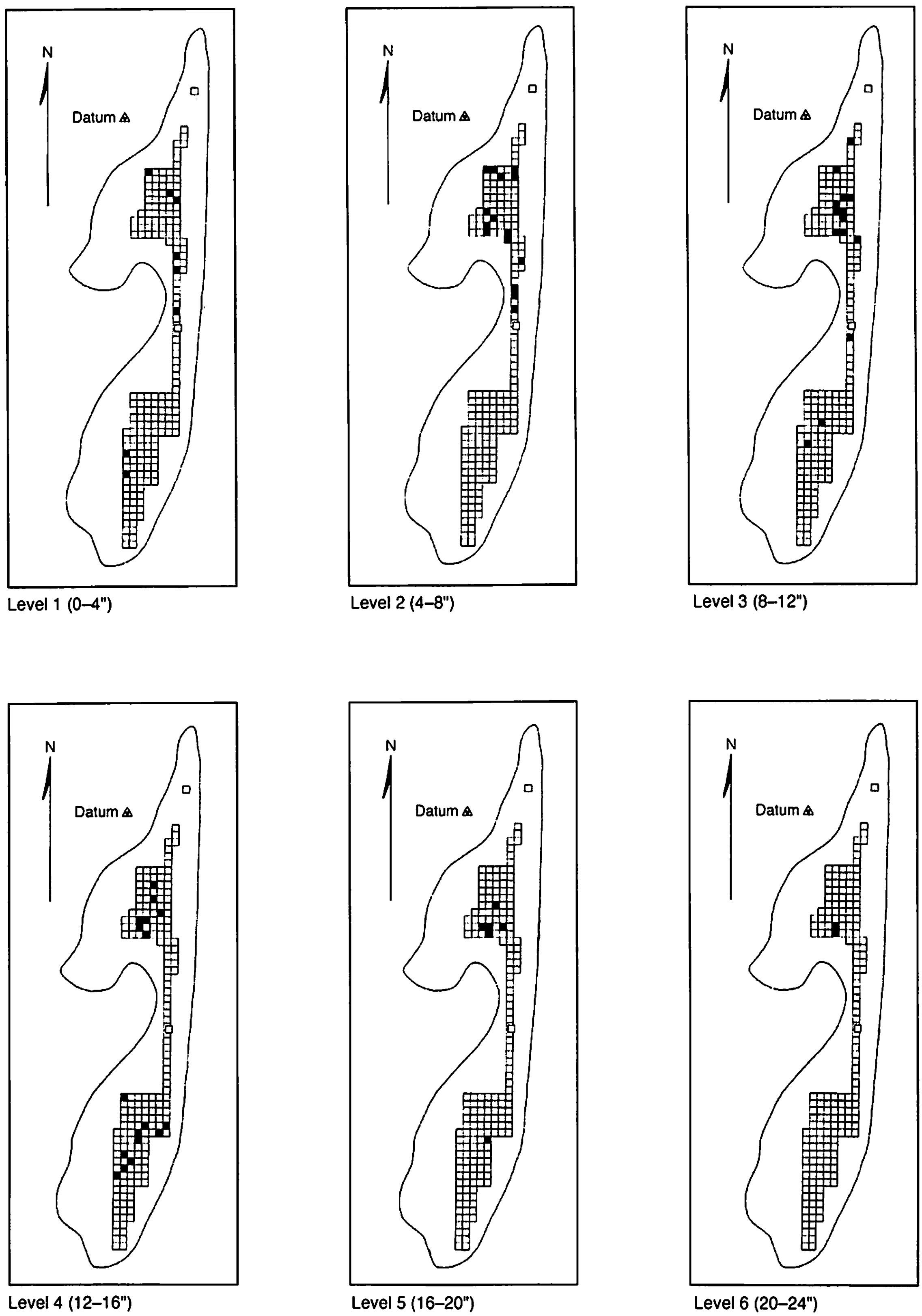


Figure 34. Distribution of projectile fragments by level.

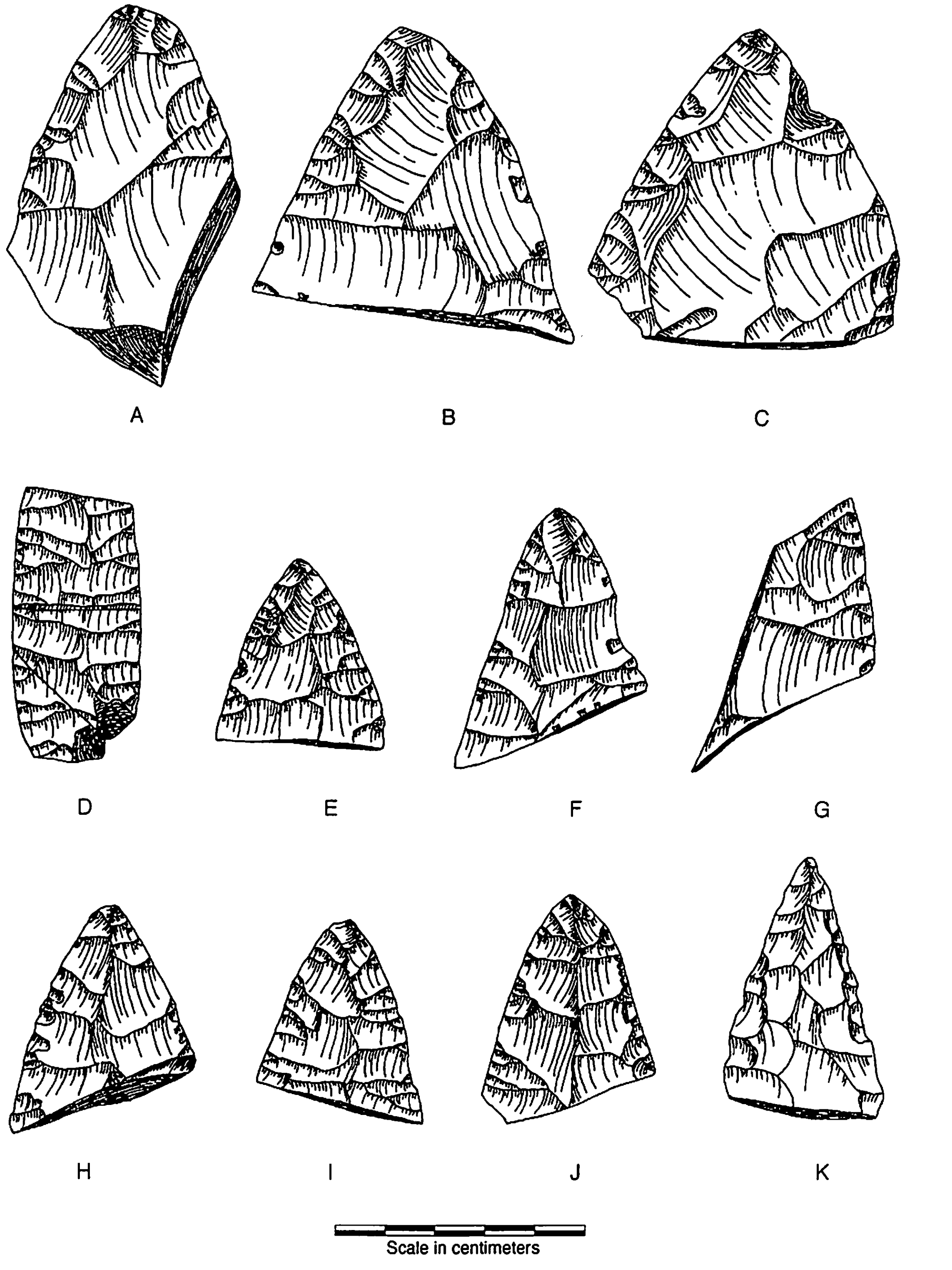


Figure 35. Projectile-point fragments: (A) #128, obsidian, point from large spear, from square S5-L1, depth 7"; (B) #68, obsidian, point from large spear, from square S10-L1, depth 10"; (C) #90, obsidian, point from large spear, from square S10-L1, depth 11"; (D) #176 (top section), #639 (lower section), obsidian, broken in three pieces, stem and point broken off (#176, from square S12-L2, depth 19"; #639 [broken in field], from square S12-L3, depth 12 to 16"); (E) #64, obsidian, from square S10-L0, depth 12 to 16"; (F) #65, obsidian, from square S13-L1, depth 12"; (G) #368, obsidian, section from large spear, from square S14-L0, depth 4 to 8"; (H) #75, obsidian, from square S40-L2, depth 12 to 16"; (I) #77, obsidian, from square S13-L2, depth 14"; (J) #192, obsidian, from square S10-L3, depth 1.5"; (K) #46, basalt, from square S4-L1, depth 8 to 12".

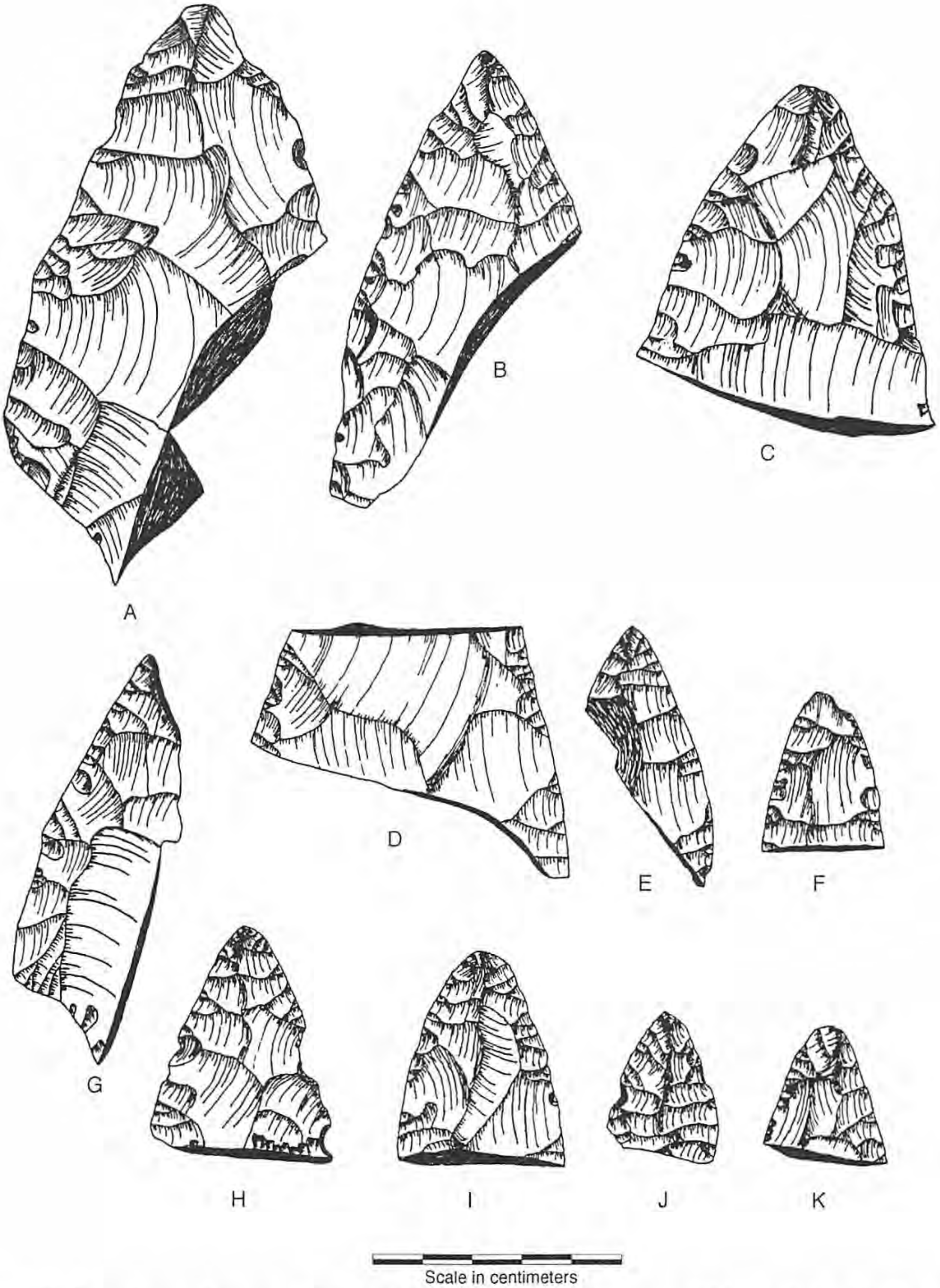


Figure 36. Projectile-point fragments: (A) #13, obsidian, thick and crude, from square S42-L2, depth 16"; (B) #52, obsidian, from square S4-L2, depth 4 to 8"; (C) #196, obsidian, from square S47-L6, depth 13"; (D) #59, obsidian, midsection, from square S10-L0, depth 11"; (E) #740, obsidian, from square S45-L4, depth 12 to 16"; (F) #442, obsidian, from square S14-R2, depth 8 to 12"; (G) #190, obsidian, from square S10-L3, depth 5"; (H) #88, obsidian, from square S44-L6, depth 3"; (I) #408, obsidian, from square S11-L3, depth 12 to 16"; (J) #48, obsidian, from square S4-L3, depth 4 to 8"; (K) #869, obsidian, from square S13-L3, depth 4 to 8".

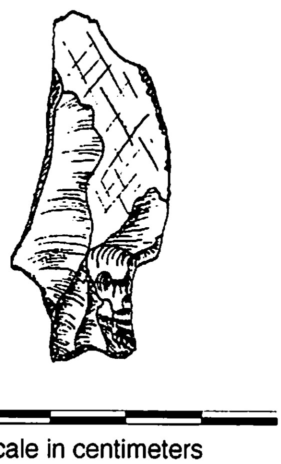


Figure 37. #612: Hafted stem knife, Fell's Cave Fish-tail type stem, made from thin flake, from square S39-L1, depth 12 to 16".

The scrapers have presented considerable difficulty in classification because of the variation of form, size, thickness, and the amount of secondary flaking. Consequently, rather than to present a lengthy series of scraper types, many represented by unique specimens, they have been grouped into four broad categories. These include flake scrapers, concave flake scrapers, blade-like scrapers, and plano-convex scrapers. Since there are differences in their distribution at the site according to whether they are of obsidian or basalt, the plano-convex scrapers are subdivided into two groups according to the material.

In considering all of the scrapers from El Inga, they tend to fall into two major groupings. One category contains those made from a flake or spall of material in which retouching is present along one or two edges. These would include the flake scrapers, concave flake scrapers, and the blade-like scrapers which are merely relatively long and narrow flakes. The second category of scrapers is also made from flakes, but these are thicker, better formed, and with considerably more secondary flaking to shape the artifact. These are generally flat on one face and convex on the other face where the trimming has taken place. Moreover, the plano-convex scrapers usually have a thick, snub-nosed scraping edge at one end.

Flake Scrapers

There are 612 items classed as flake scrapers from the excavations. These are represented by flakes in which trimming flakes have been removed along one or more edges, usually taken from only one face of the artifact. Examples of flake scrapers are illustrated in Figures 45, 46 and 47.

They are represented by irregular flakes without consistency in form, and many appear to have been broken. Many of these specimens have resulted from using an obsidian flake for a scraper; in others, the scraping edges were delib-

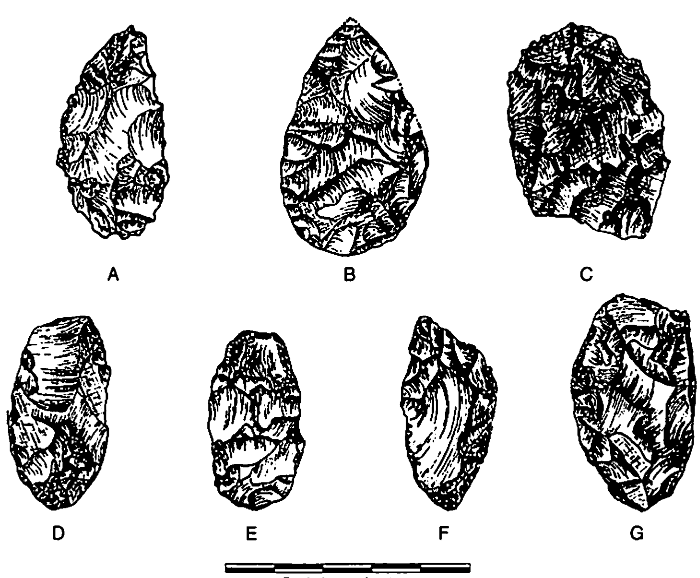


Figure 38. Complete obsidian biface knives: (A) #50, ovate knife, from square S4-L1, depth 8 to 12"; (B) #828, ovate knife, broken in field, from square S11-L0, depth 16 to 20"; (C) #61, ovate knife, broken end, from square S36-L1, depth 8 to 12"; (D) #733, ovate knife, from square S10-L1, depth 16 to 20"; (E) #6, ovate knife, from square S5-L3, depth 4 to 8"; (F) #221, knife, from square S11-L1, depth 16 to 18"; (G) #742, ovate knife, made from flake, from square S45-L4, depth 12 to 16".

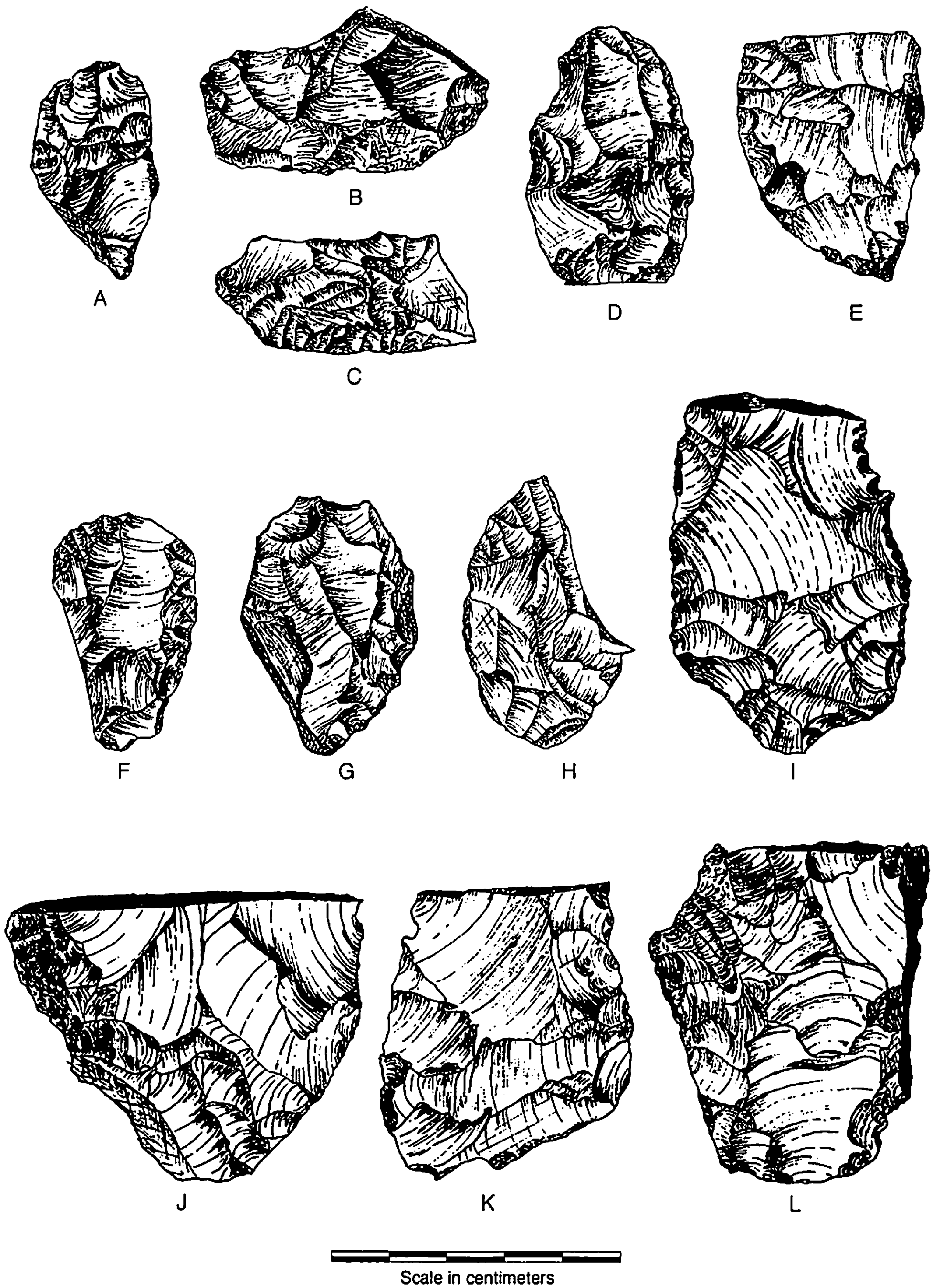


Figure 39. Obsidian biface knife fragments: (A) #397, knife, broken end, from square S9-L0, depth 16 to 20"; (B) #70, knife fragment, from square S8-L1, depth 13"; (C) #597, knife fragment, from square S9-L3, depth 4 to 8"; (D) #203, ovate knife, broken end, from square S18-R2, depth 6"; (E) #172, knife fragment, from square S11-L2, depth 17"; (F) #685, knife fragment, from square S40-R1, depth 12 to 16"; (G) #216, knife fragment, from square S12-L1, depth 8 to 10"; (H) #158, knife fragment, from square S11-L2, depth 16"; (L) #81, knife fragment, from square S13-L0, depth 11"; (J) #67, knife fragment, from square S9-L0, depth 12"; (K) #827, knife fragment, from square S11-L0, depth 8 to 12"; (L) #761, knife fragment, angular edge, from square N0-R1, depth 8 to 12".

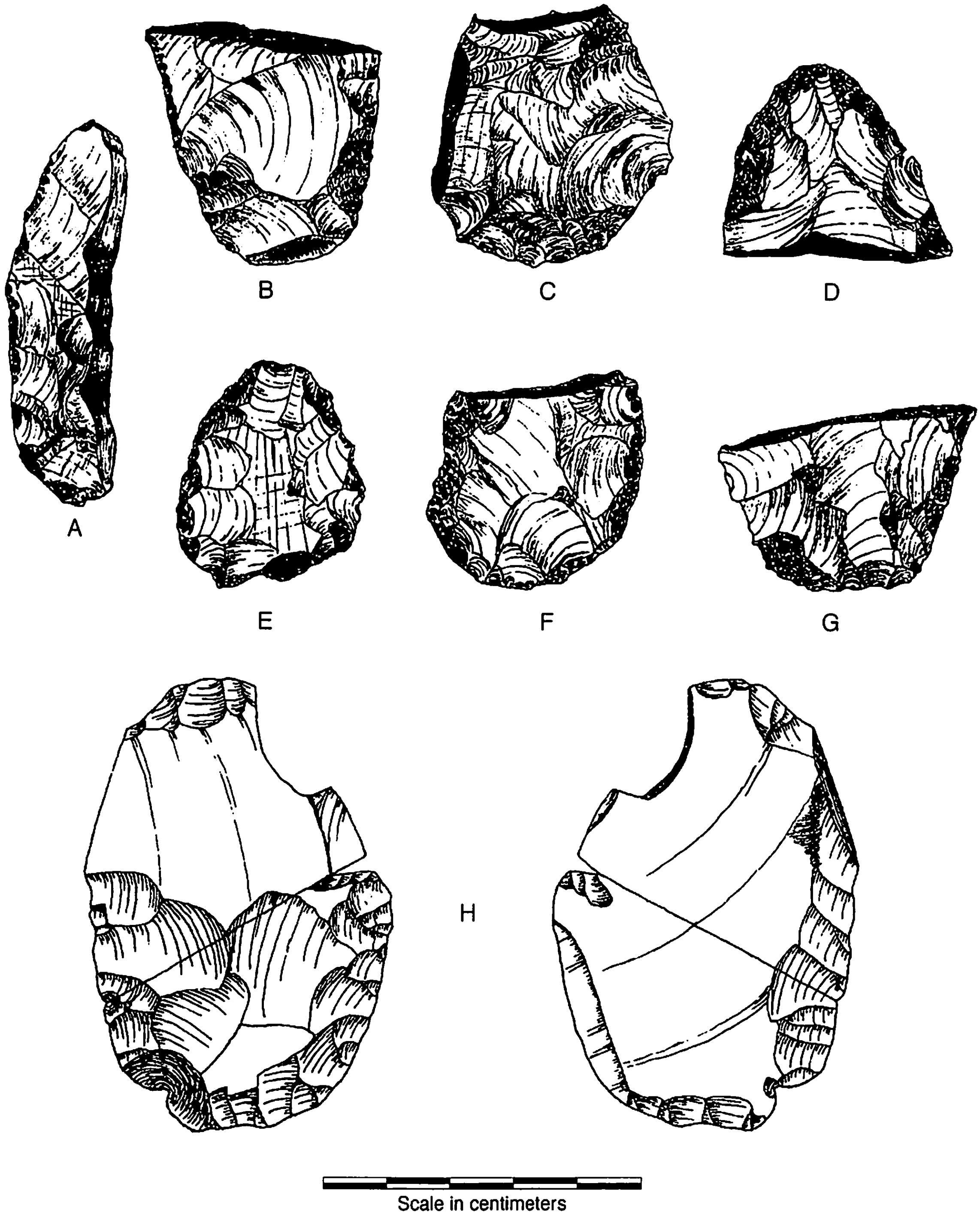


Figure 40. Obsidian biface knife fragments: (A) #398, knife fragment, from square S9-L0, depth 12 to 16"; (B) #785, knife fragment, from square S13-L2, depth 12 to 16"; (C) #73, knife fragment, from square S12-L2, depth 13"; (D) #183, knife fragment, from square S12-L2, depth 17"; (E) #58, knife fragment, from square S13-R1, depth 8 to 12"; (F) #878, knife fragment, from square S13-L3, depth 12 to 16"; (G) #30, knife fragment, from square S37-L0, depth 10 to 12"; (H) #793, broken knife, made from flake, broken in the field, abraded area on upper right side from wear, from square S13-L2, depth 16 to 20".

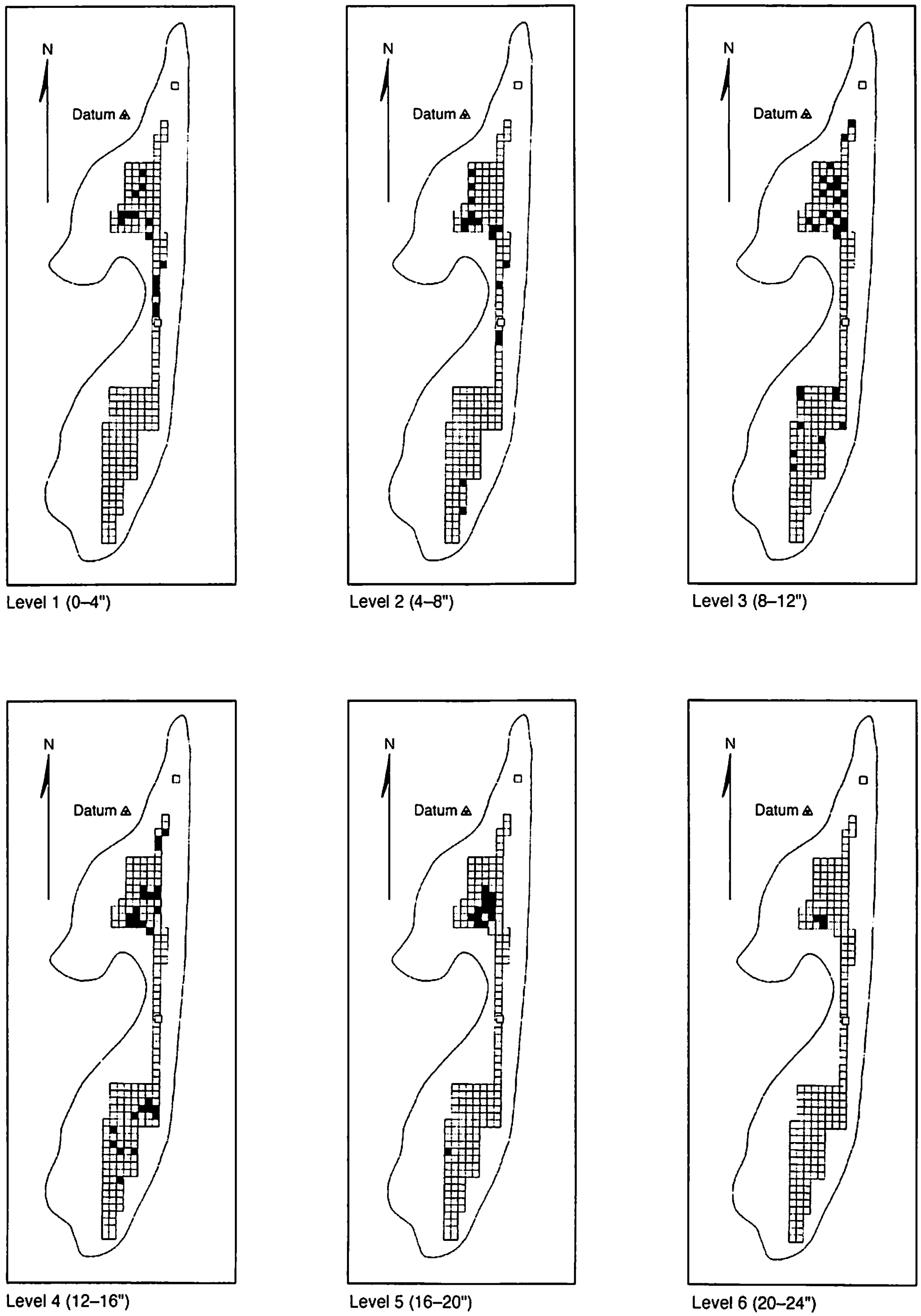


Figure 41. Distribution of bifacial knives by level.

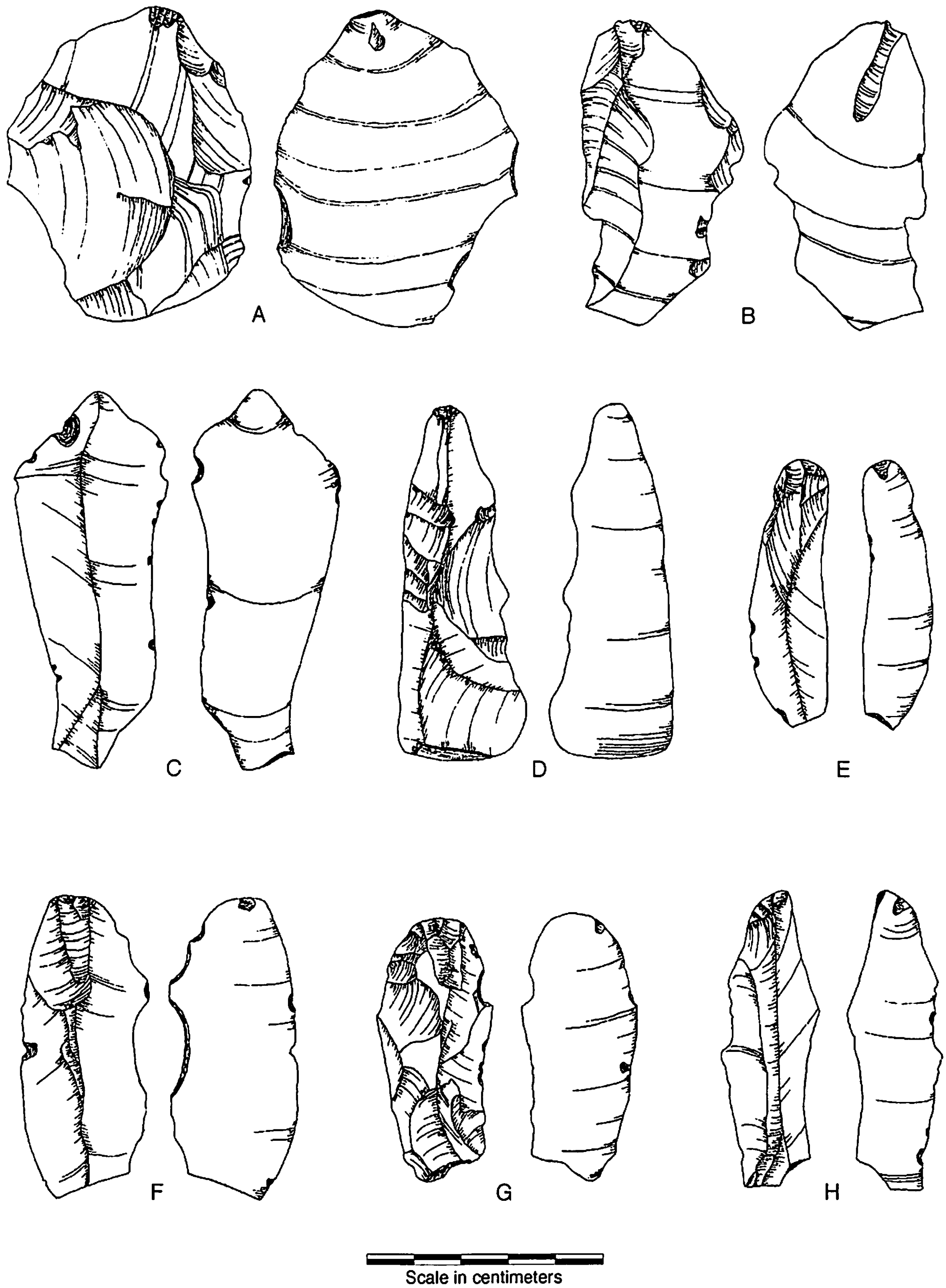


Figure 42. Obsidian flake knives: (A) #436, from square S49-L4, depth 12 to 16"; (B) #280, from square S39-L2, depth 12 to 16"; (C) #516, from square S45-L6, depth 12 to 16"; (D) #450, from square S8-L3, depth 4 to 8"; (E) #479, from square S48-L2, depth 4 to 8"; (F) #107, from square S5-L1, depth 8 to 10"; (G) #566, from square S12-L0, depth 8 to 12"; (H) #197, from square S41-L4, depth 12 to 16".

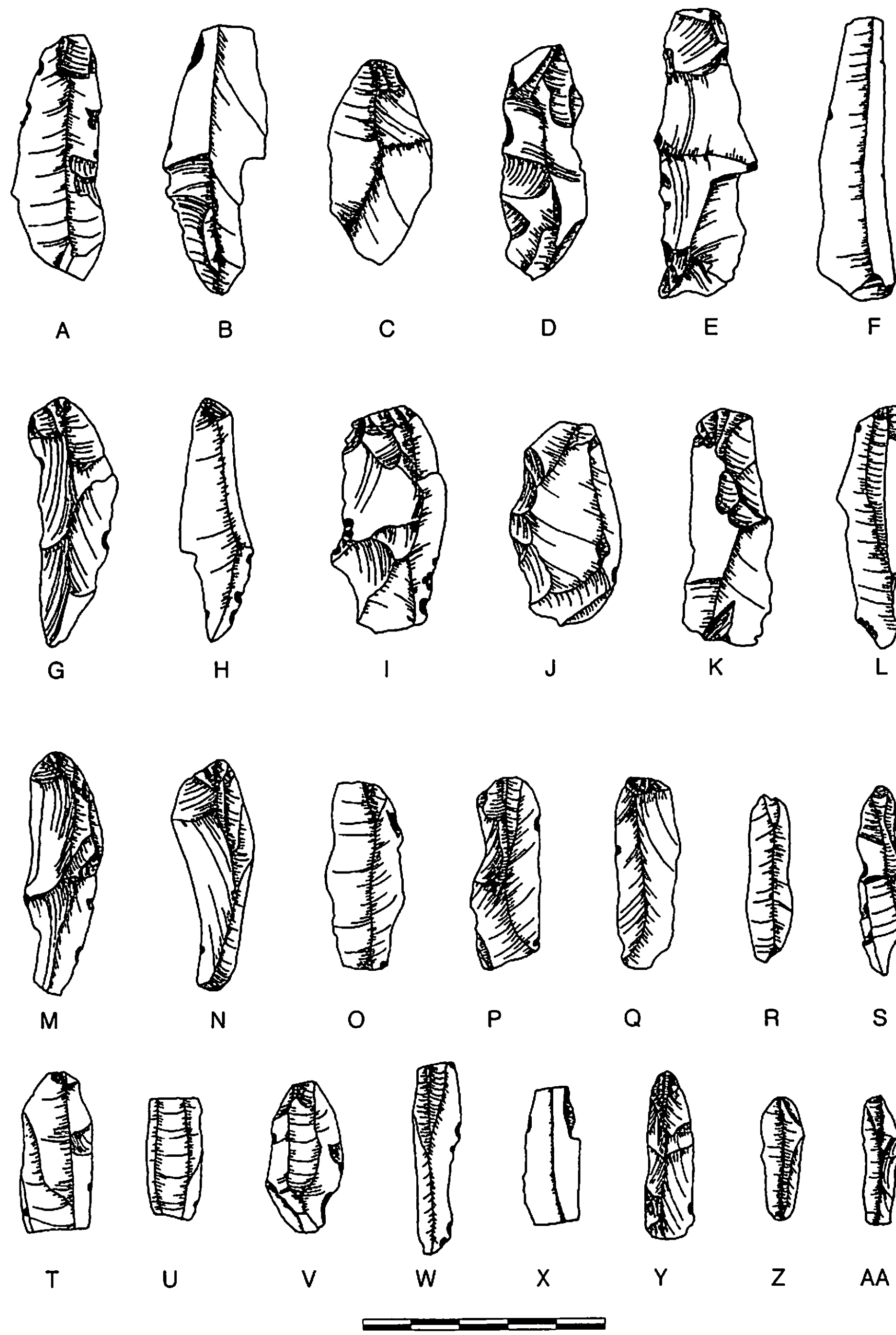


Figure 43. Obsidian flake knives: (A) #449, from square S8-L3, depth 0 to 4"; (B) #406, from square S11-L3, depth 4 to 8"; (C) #665, from square S12-L3, depth 4 to 8"; (D) #541, from square S54-L6, depth 8 to 12"; (E) #436, from square S49-L4, depth 12 to 16"; (F) #239, from square S12-L2, depth 14 to 16"; (G) #465, from square S49-L61, depth 12 to 16"; (H) #415, from square S43-L2, depth 12 to 16"; (I) #665, from square S12-L3, depth 4 to 8"; (J) #662, from square S42-L4, depth 12 to 16"; (K) #110, from square S39-L0, depth 12 to 14"; (L) #581, from square S45-L3, depth 12 to 16"; (M) #178, from square S12-L2, depth 20 to 24"; (N) #142, from square S6-L0, depth 8 to 10"; (O) #730, from square S37-R1, depth 12 to 16"; (P) #218, from square S12-L1, depth 14 to 16"; (Q) #444, from square S7-L2, depth 4 to 8"; (R) #653, from square S1-R1, depth 4 to 8"; (S) #389, from square S46-L5, depth 8 to 12"; (T) #480, from square S48-L2, depth 8 to 12"; (U) #604, from square S40-L1, depth 8 to 12"; (V) #24, from square S37-L1, depth 12 to 14"; (W) #568, from square R2-L0, depth 16 to 20"; (X) #417, from square S46-L6, depth 8 to 12"; (Y) #564, from square S43-L3, depth 12 to 16"; (Z) #663, from square S8-R1, depth 0 to 4"; (AA) #44, from square S38-L1, depth 12 to 14"

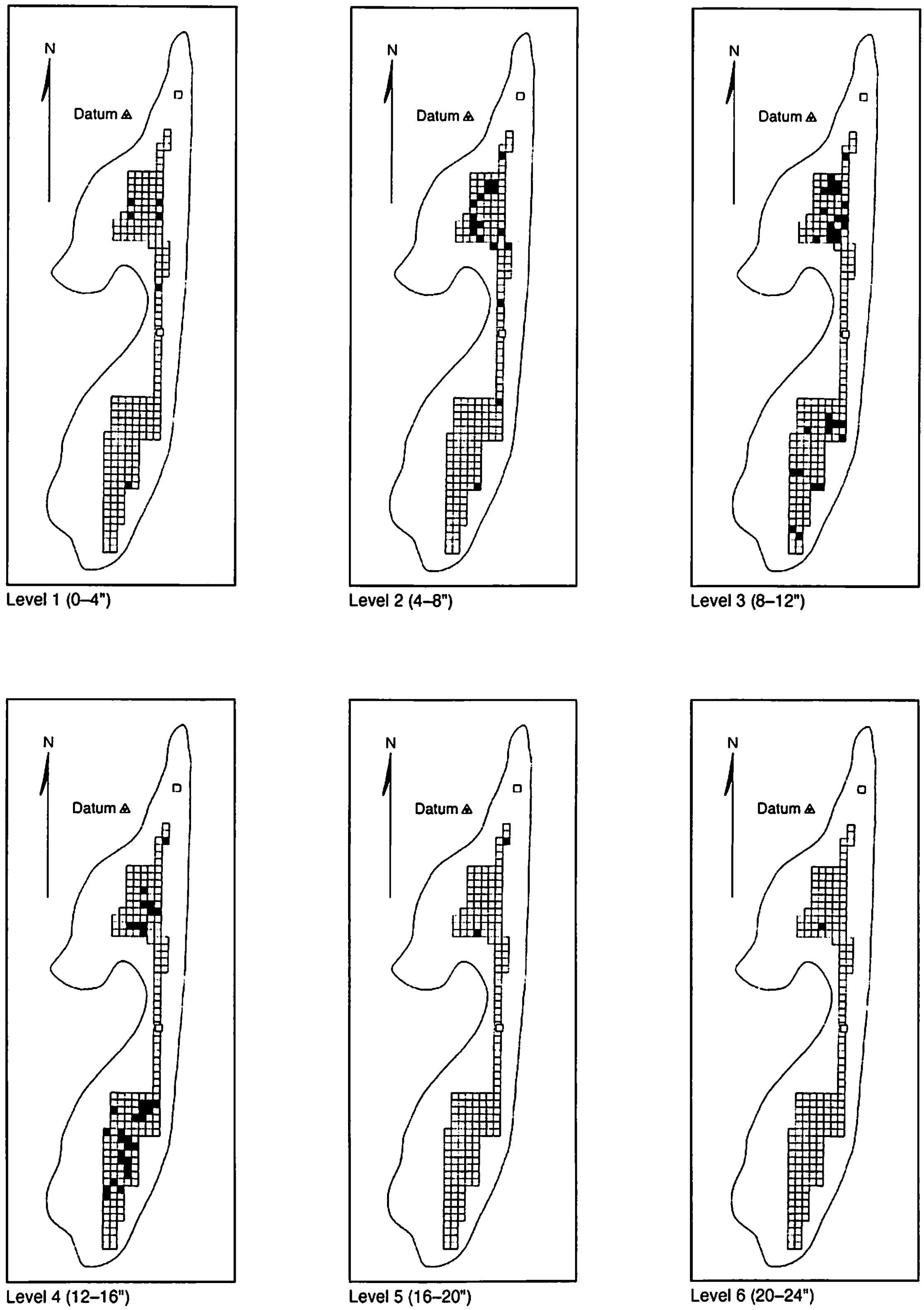


Figure 44. Distribution of flake knives by level

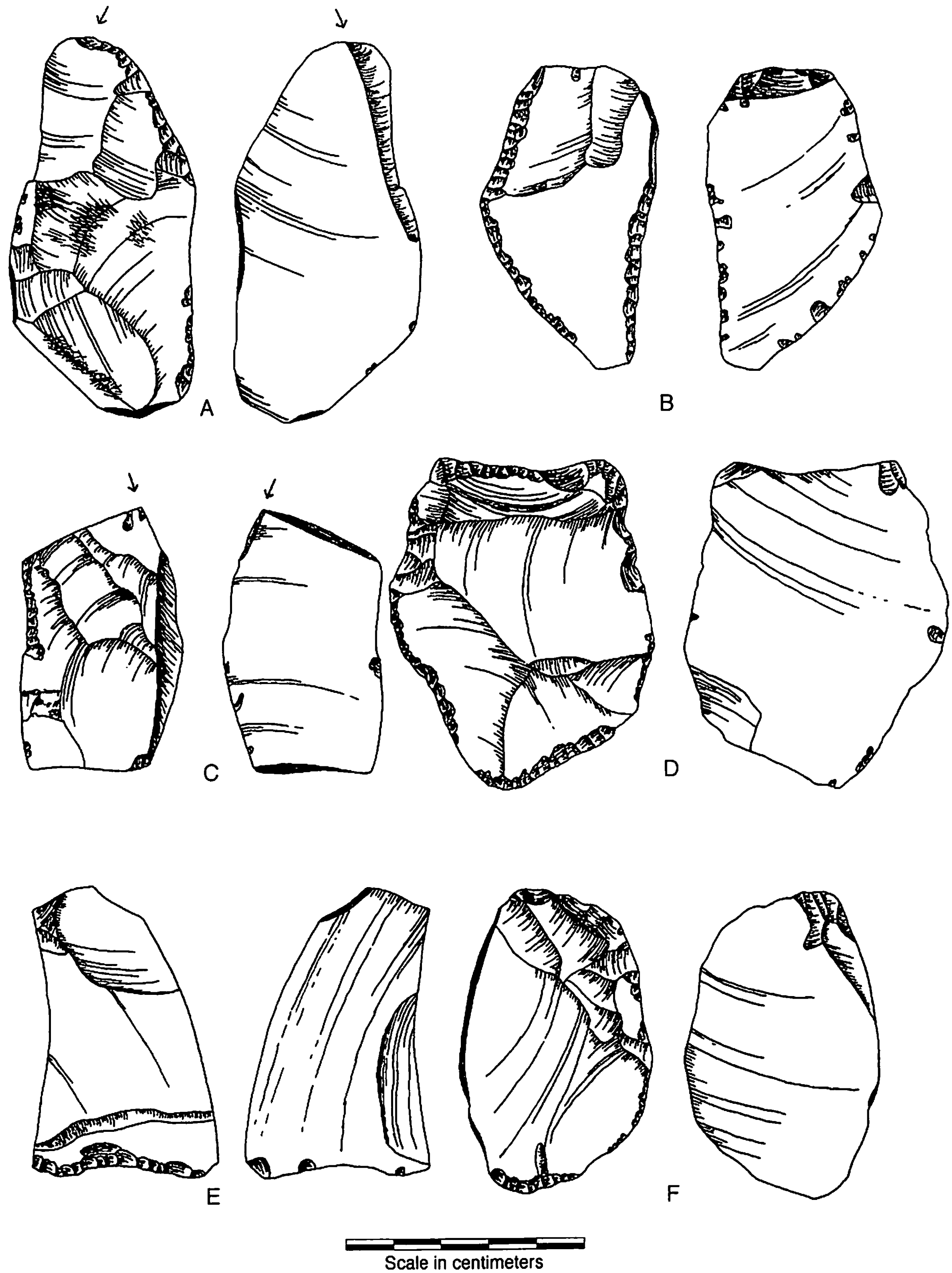


Figure 45. Flake scrapers (arrows indicate burin blows): (A) #51, obsidian, front and back view, one burin facet, from square S40-L2, depth 8 to 12"; (B) #733, obsidian, front and back view, from square S10-L1, depth 16 to 20"; (C) #146, obsidian, front and back view, one burin facet, from square O-S5, depth 8 to 10"; (D) #394, obsidian, front and back view, from square S48-L4, depth 12 to 16"; (E) #178, obsidian, front and back view, from square S12-L2, depth 20 to 24"; (F) #286, obsidian, front and back view, from square S36-R1, depth 12 to 16".

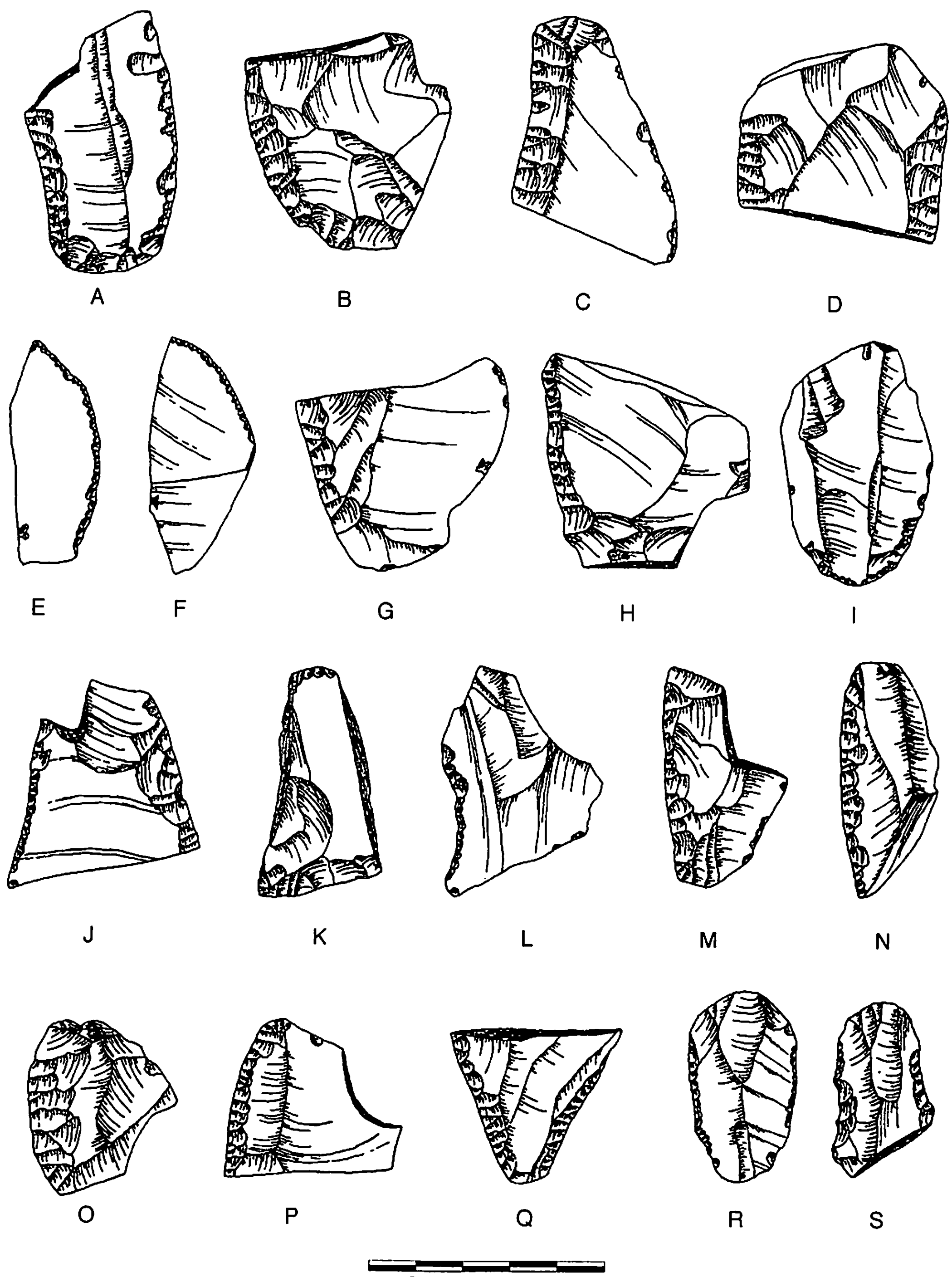


Figure 46. Flake scrapers: (A) #869, obsidian, from square S13-L3, depth 4 to 8"; (B) #642, obsidian, from square S12-L3, depth 16 to 20"; (C) #335, obsidian, from square S9-L1, depth 8 to 12"; (D) #398, obsidian, from square S9-L0, depth 12 to 16"; (E) #859, obsidian, from square S38-R1, depth 8 to 12"; (F) #366, obsidian, from square S12-R1, depth 8 to 12"; (G) #181, obsidian, from square S12-L2, depth 22 to 24"; (H) #831, obsidian, from square S8-L1, depth 16 to 20"; (I) #100, obsidian, from square S6-L0, depth 7"; (J) #354, obsidian, from square S8-L0, depth 12 to 16"; (K) #831, obsidian, from square S8-L1, depth 16 to 20"; (1) #286, obsidian, from square S36-R1, depth 12 to 16"; (M) #804, obsidian, from square S44-L5, depth 12 to 16"; (N) #337, obsidian, from square S9-L1, depth 16 to 20"; (O) #337, obsidian, from square S9-L1, depth 16 to 20"; (P) #335, obsidian, from square S9-L1, depth 8 to 12"; (Q) #280, obsidian, from square S39-L2, depth 12 to 16"; (r) #93, obsidian, from square S43-L5, depth 8 to 12"; (S) #320, obsidian, from square S28-R1, depth 0 to 4".

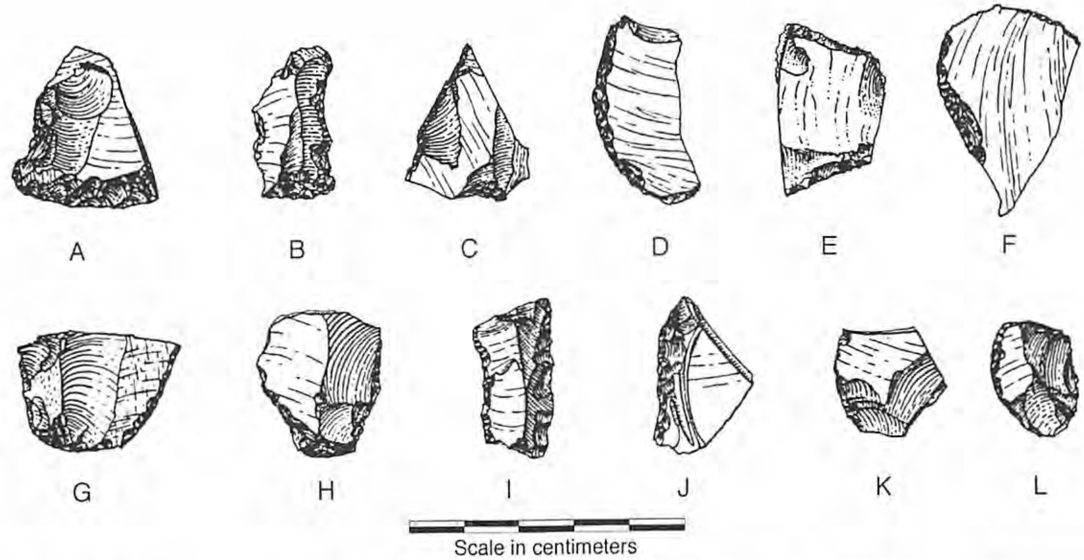


Figure 47. Flake scrapers: (A) #109, obsidian, from square O-S38, depth 10 to 12"; (B) #536, obsidian, from square S46-L2, depth 12 to 16"; (C) #641, obsidian, from square S41-L1, depth 12 to 16"; (D) #612, obsidian, from square S39-L1, depth 12 to 16"; (E) #280, flint, from square S39-L2, depth 12 to 16"; (F) #220, obsidian, from square S11-L1, depth 14 to 16"; (G) #730, obsidian, from square S37-R1, depth 12 to 16"; (H) #662, obsidian, from square S42-L4, depth 12 to 16"; (I) #427, obsidian, from square S46-L6, depth 0 to 4"; (J) #110, obsidian, from square O-S38, depth 12 to 14"; (K) #313, obsidian, from square S39-L5, depth 8 to 12"; (l) #448, obsidian, from square S13-L5, depth 4 to 8".

erately produced by percussion or pressure, either to shape the scraping edge or to resharpen it for further work.

Experiments in the laboratory with obsidian flakes have produced similar artifacts. When a relatively thin, unmodified obsidian flake is used upon wood or bone for a scraper, the scraping process removes small chips from the edge, and continued use will produce a retouched scraper. Finely retouched edges are produced by scraping soft wood (white pine), hard wood (oak) and deer antler. The size of the flake scar produced depends upon the hardness of the material as well as upon the force applied in the scraping process. Most of the flake scars, however, range in length from 0.1 to 3.0 mm, longer scars being rare or requiring a special effort to produce them. After the scraper has been used for some time, the edge becomes dulled, and it is no longer efficient unless it is resharpened by secondary trimming. Trimming with a hammer stone usually results in longer flake scars, commonly up to 5.0 or 8.0 mm in length; this also helps to straighten an irregular edge.

The flake scrapers from El Inga are believed to be primarily utilized flakes in which the scraping edge has been produced by usage or resharpening to create a fresh working edge. The flake scrapers would be most effective for the working of wood and bone, and many of them would not be suitable for preparing skins or hides.

The flake scrapers range in size from a small fragment less than 1.0 to 8.2 cm in length. Three specimens are made of flint, one from level 3 (8 to 12"), and two from level 4 (12 to 16"); five specimens are made of basalt. The basalt specimens occur as follows; one in level 1 (0 to 4"), three in level 2 (4 to 8"), and one in level 4 (12 to 16"). The remainder are all of obsidian (604 specimens) with a maximum number occurring in level 3 (8 to 12"). Vertical distribution of flake scrapers according to the depth from the surface is shown in Table 8. The horizontal distribution according to the various levels is shown in Figure 48.

The flake scrapers occur throughout all levels and in all sections of the site. A comparison of

Table 8. Vertical distribution of flake scrapers.

Depth in inches	Flake scrapers
0 to 4	135
4 to 8	151
8 to 12	166
12 to 16	119
16 to 20	32
20 to 24	6
Total	612

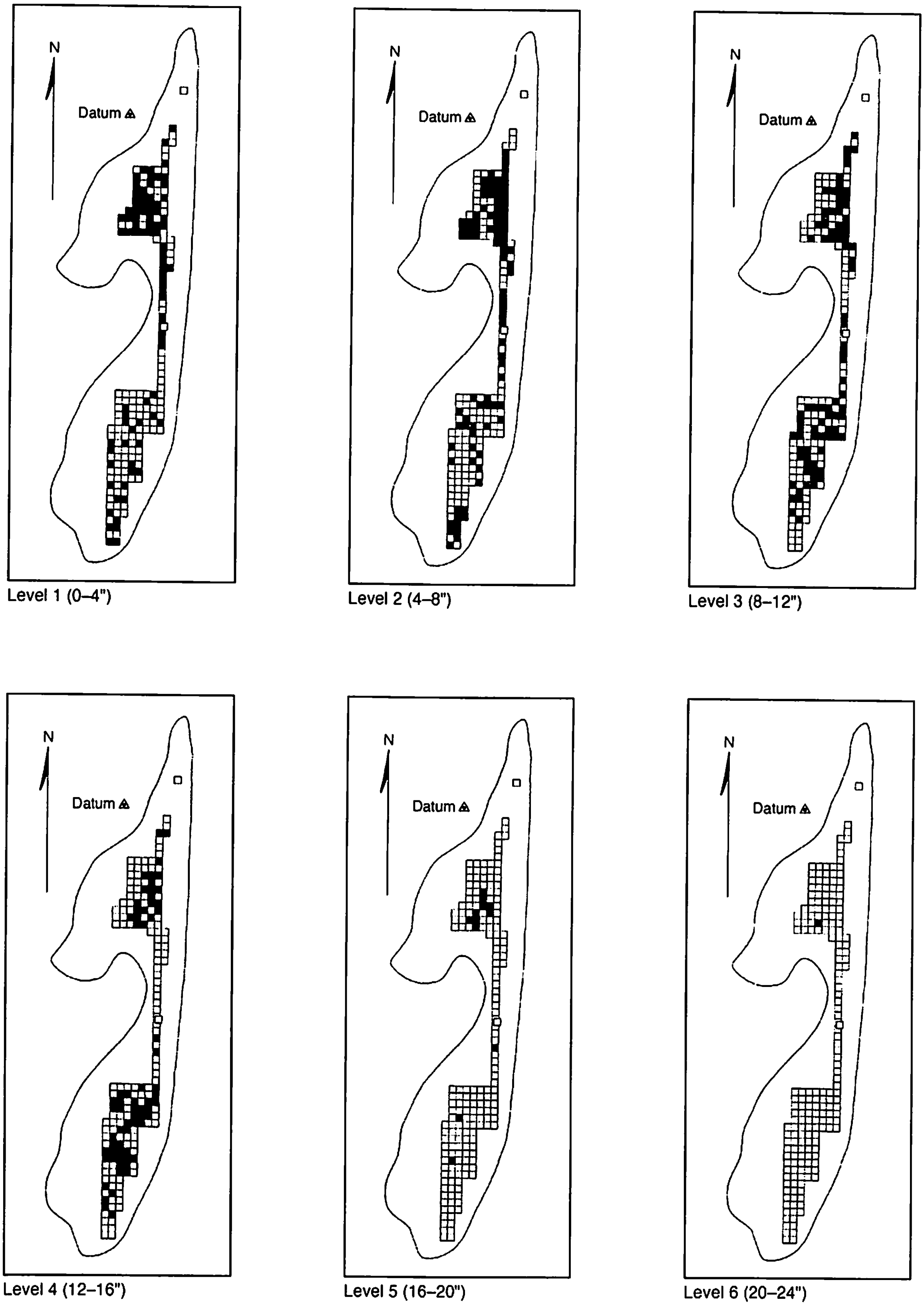


Figure 48. Distribution of flake scrapers by level.

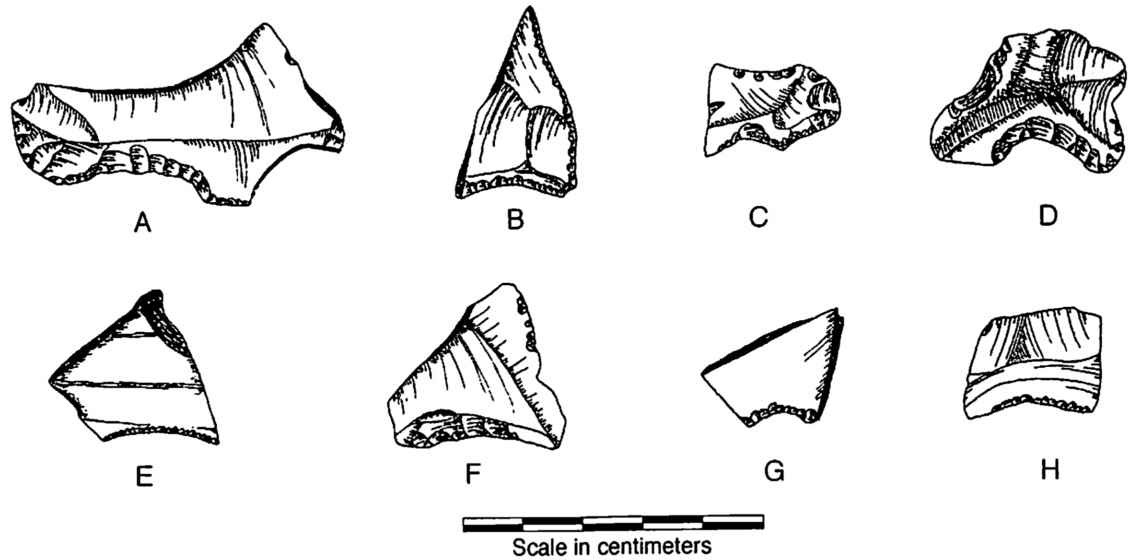


Figure 49. Concave flake scrapers: (A) #777, obsidian, from square S13-L1, depth 12 to 16"; (B) #877, obsidian, from square S9-R1, depth 4 to 8"; (C) #327, obsidian, from square S13-L2, depth 0 to 4"; (D) #542, obsidian, from square S50-L5, depth 0 to 4"; (E) #391, obsidian, from square S26-R1, depth 8 to 12"; (F) #484, obsidian, from square S45-L5, depth 12 to 16"; (G) #25, obsidian, from square S37-L1, depth 10 to 12"; (H) #273, obsidian, from square S22-R1, depth 4 to 8".

specimens from the lower levels with the upper levels suggests that larger flakes are more common in the lower levels; the presence of plowing and possible breakage in the upper levels, however, may have contributed to this distinction.

One specimen, illustrated in Figure 45A, exhibits areas of extensive wear upon one surface. The significance of this abrasion is not apparent.

Concave Flake Scrapers

There are 45 flake scrapers in which the scraping edge is concave or slightly hollowed out. Examples of concave scrapers are shown in Figure 49. They are made from small flakes, and the curved scraping edge appears to have been made by usage in shaping cylindrical objects. The size ranges from 2.0 to 5.6 cm in maximum length with most examples falling between 2.0 and 4.0 cm. One specimen is made of basalt (level 1), one is of flint (level 3), and the remainder are made of obsidian.

Table 9. Vertical distribution of convex flake scrapers.

Depth in inches	Convex flake scrapers
0 to 4	12
4 to 8	12
8 to 12	14
12 to 16	7
16 to 20	0
20 to 24	0
Total	45

The distribution according to depth is shown in Table 9, and it is interesting that no examples are found below level 4 (12 to 16"). The horizontal distribution according to the various levels is shown in Figure 50. Although the sample is small, the concentration of specimens toward the southern section of the excavations in level 3 (8 to 12") may be significant.

Blade-like Scrapers

There are 36 relatively long and narrow flakes that are classed as blade-like scrapers. These resemble the flake scrapers except that they are relatively narrow and more blade-like in outline (Fig. 51). They do not appear to be true blades (prismatic flakes, lamellar flakes) as they were not struck from a faceted core (polyhedral core).

All of the specimens are made of obsidian with a single exception, made of flint, found in level 4 (12 to 16"). They exhibit a scraping edge on one or both sides and occasionally at the ends. The flake scars are small in size and suggest that they were produced through use as a scraper. The length ranges from 2.7 to 7.7 cm, and all examples are quite thin in cross section. The distribution according to depth in the excavations is shown in Table 10, and the horizontal distribution according to the square and level is shown in Figure 52. The specimens are most abundant in level 4 (12 to 16") and at the southern section of the excavations.

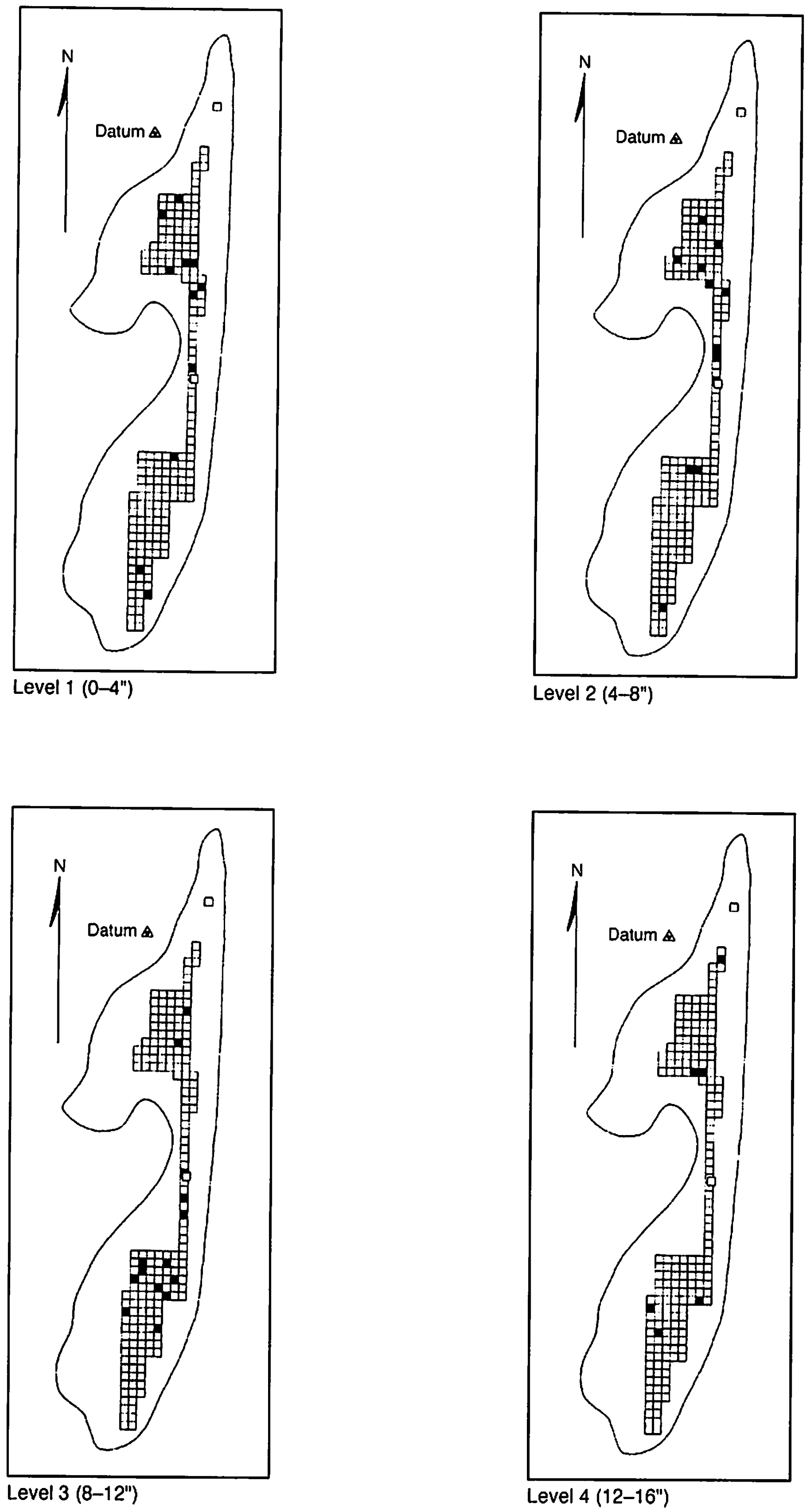


Figure 50. Distribution of concave flake scrapers by level.

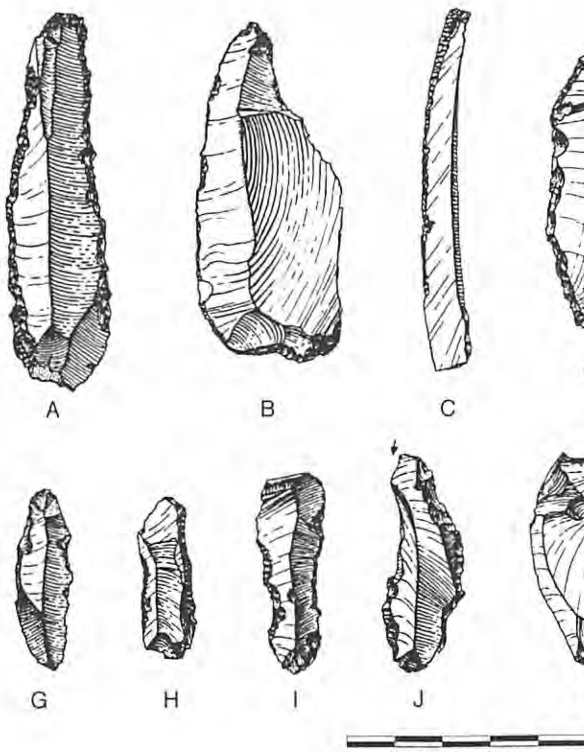


Figure 51. Blade-like scrapers (arrow indicates burin blow): (A) #127, obsidian, from square S41-L6, depth 12 to 16"; (B) #234, obsidian, from square S12-L2, depth 24 to 26"; (C) #611, obsidian, from square S40-L1, depth 12 to 16"; (D) #180, obsidian, from square S12-L1, depth 15"; (E) #197, obsidian, from square S41-L4, depth 12 to 16"; (F) #737, obsidian, burin facet at one end, from square S5-R1, depth 4 to 8"; (G) #435, obsidian, from square S49-L4, depth 8 to 12"; (H) #583, obsidian, from square S47-L3, depth 8 to 12"; (I) #445, obsidian, from square S6-L3, depth 0 to 4"; (J) #300, obsidian, burin facet at one end, from square N2-R2, depth 12 to 16"; (K) #468, obsidian, from square S17-R2, depth 4 to 8"; (L) #35, obsidian, from square O-S38, depth 6 to 8"; (M) #733, obsidian, from square S10-L1, depth 16 to 20".

Plano-convex Scrapers

There is a total of 156 plano-convex scrapers including whole and fragmentary specimens of obsidian, flint, and basalt. Of these, 133 are made of obsidian, 18 are of basalt, and 5 are of flint.

The plano-convex scrapers contrast with the flake scrapers in that they are thicker in cross section, more carefully shaped by intentional flaking, and feature a thick, snub-nosed scraping edge. One surface is flat, usually representing the flake scar of a large flake from which the scraper was manufactured; the other surface is convex and displays numerous flake scars from the secondary chipping. The scraping edge shows more careful preparation, and, although these specimens would serve equally well for scraping wood or bone, it is suggested that they were used primarily in hide or skin preparation.

Table 10. Vertical distribution of blade-like flake scrapers.

Depth in inches	Blade-like flake scrapers
0 to 4	5
4 to 8	5
8 to 12	11
12 to 16	13
16 to 20	1
20 to 24	1
Total	36

There is considerable variation in form, size, and thickness. The shapes includes triangular, ovate, circular, semicircular, roughly rectangular, and other forms, none of which appears distinctive for any particular level of the site. Most forms are made in both obsidian or basalt, and occasionally in flint. Only one form is represented by several examples. This is a thick, keeled or humpbacked scraper having a narrow elliptical outline. Illustrations of this type are shown in Figure 54I and J, and Figure 56D, E, G, H, and I. There are 10 examples of this type, including

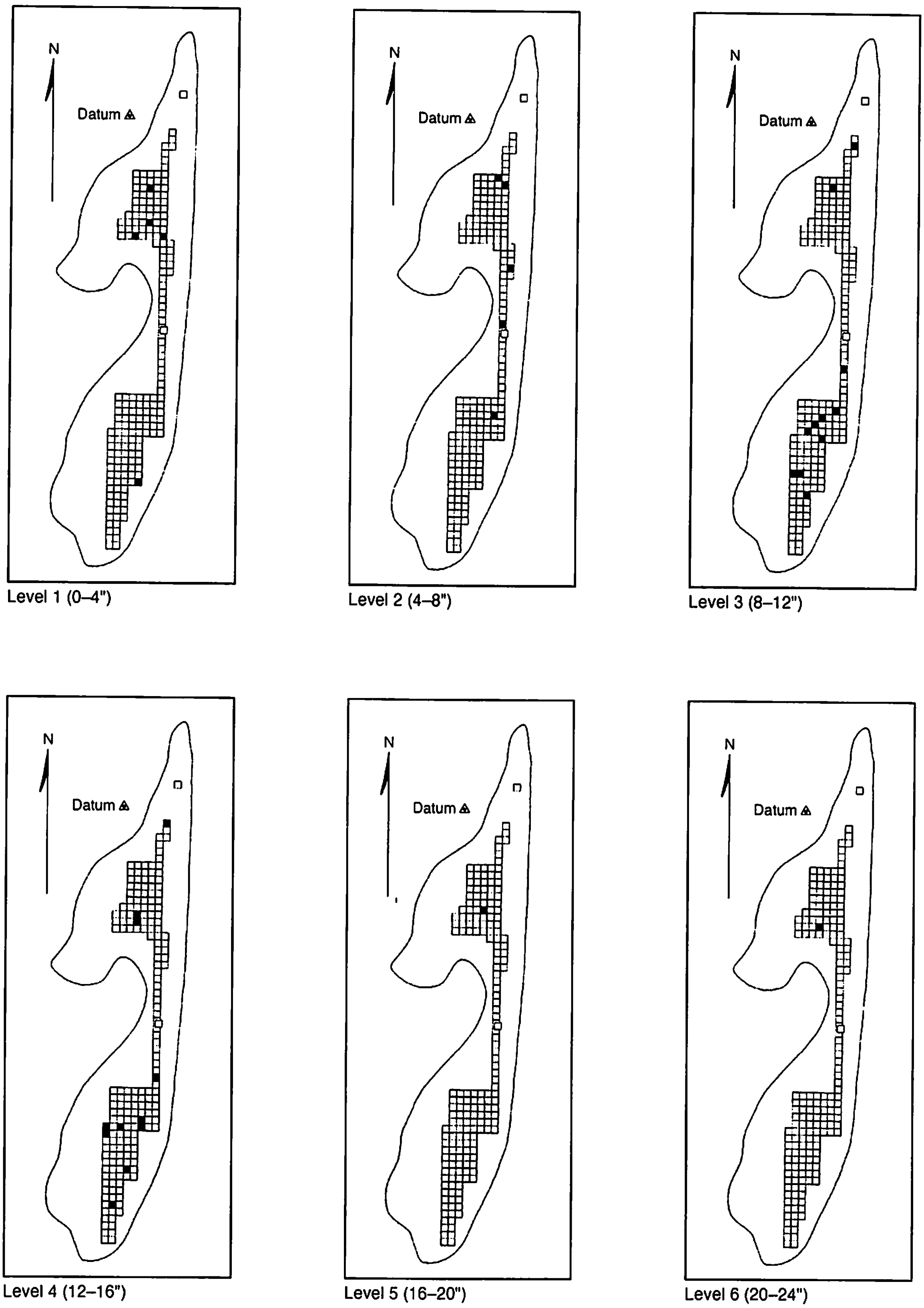


Figure 52. Distribution of blade-like scrapers by level.

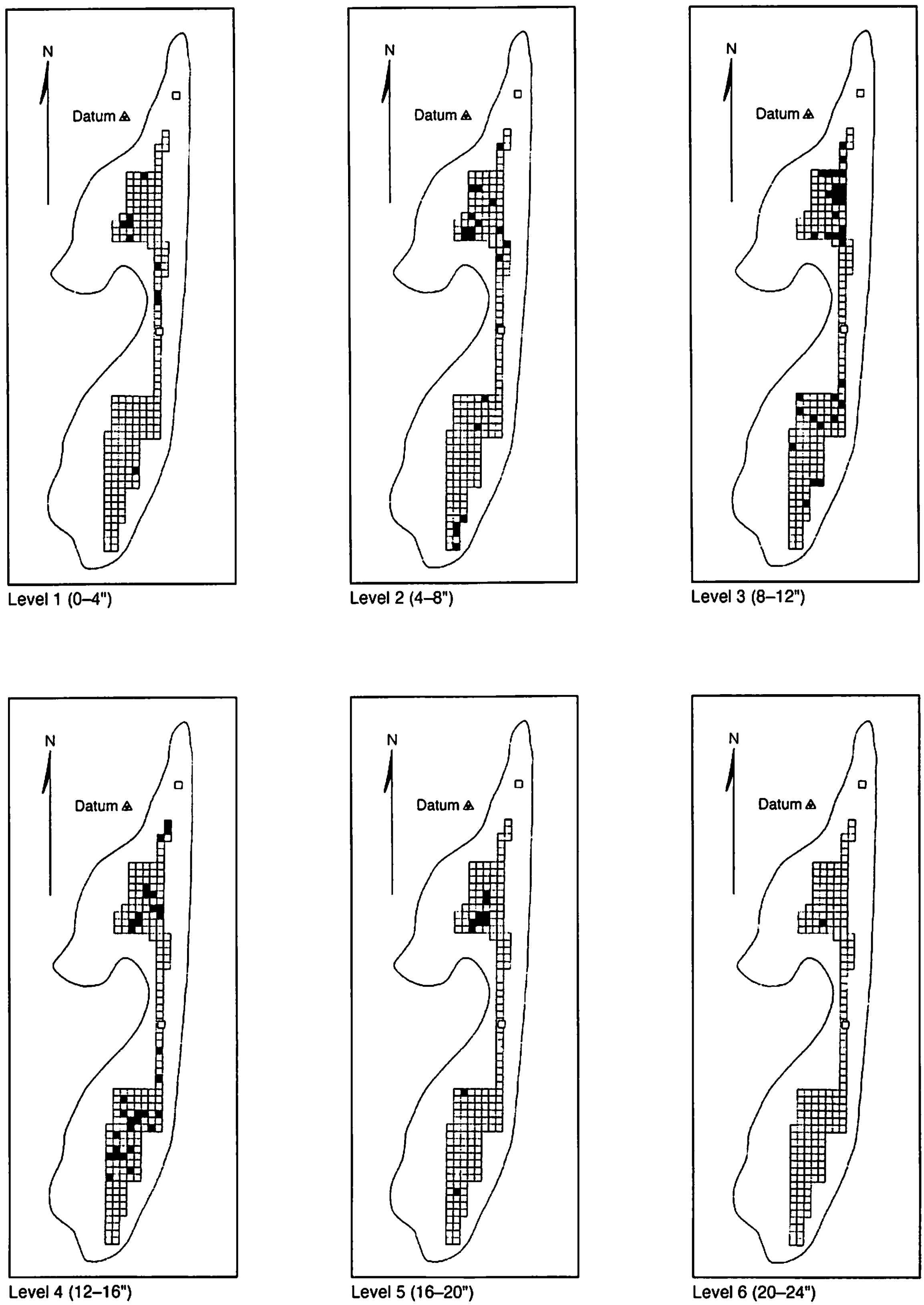


Figure 53. Distribution of obsidian plano-convex scrapers by level.

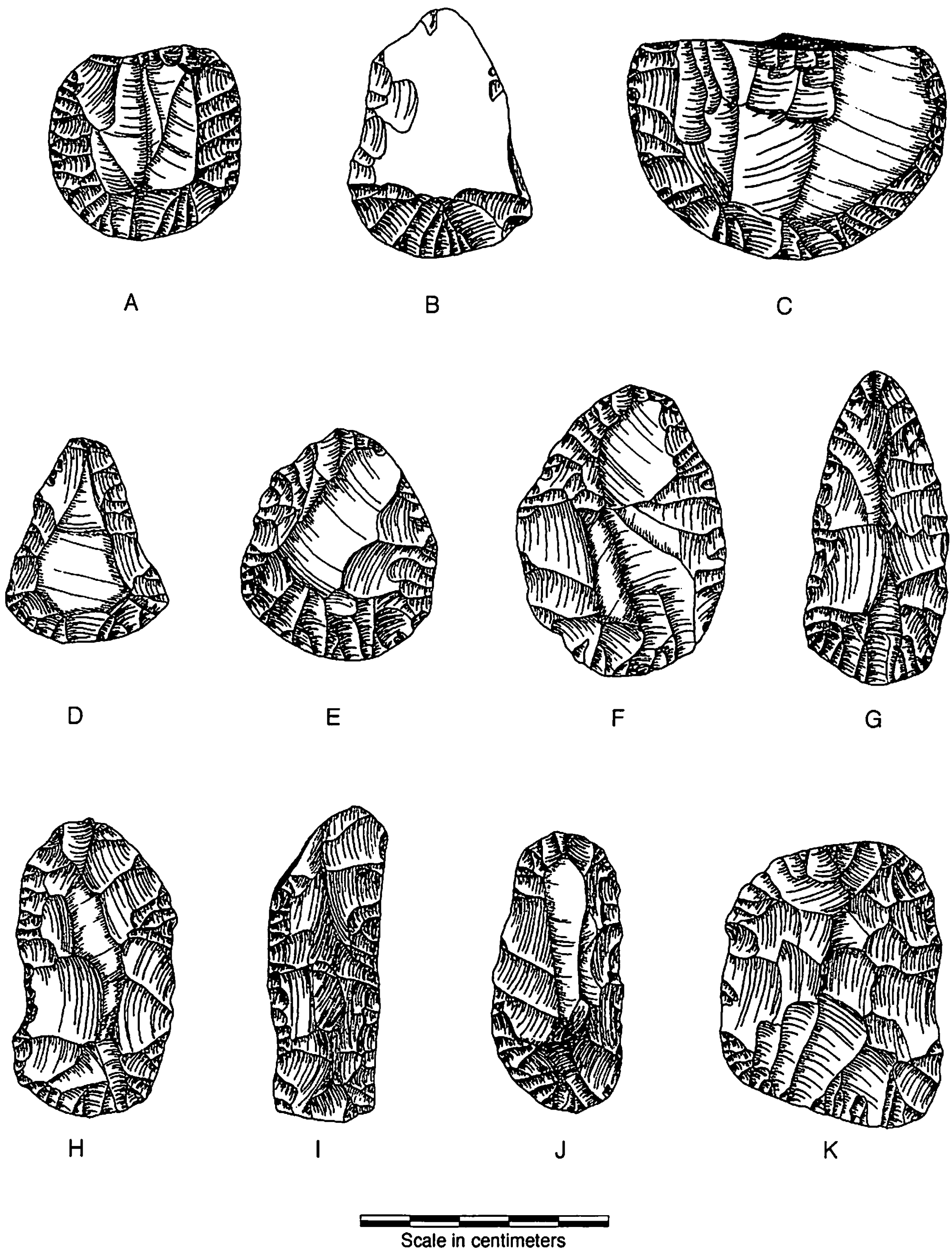


Figure 54. Obsidian plano-convex scrapers: (A) #83, obsidian, from square S11-L4, depth 0 to 4"; (B) #202, obsidian, from square S50-14, depth 10"; (C) #87, obsidian, from square S13-L3, depth 6"; (D) #677, obsidian, from square S8-R1, depth 8 to 12"; (E) #872, obsidian, from square S13-L3, depth 8 to 12"; (F) #167, obsidian, from square S12-L2, depth 20.5"; (G) #116, obsidian, from square S44-L3, depth 12.5"; (H) #301, obsidian, from square S11-R1, depth 12 to 16"; (I) #72, obsidian, broken at each end, from square S12-L2, depth 15.5"; (J) #750, obsidian, from Square S10-R1, depth 12 to 16"; (K) #187, obsidian, from square O-R1, depth 14".

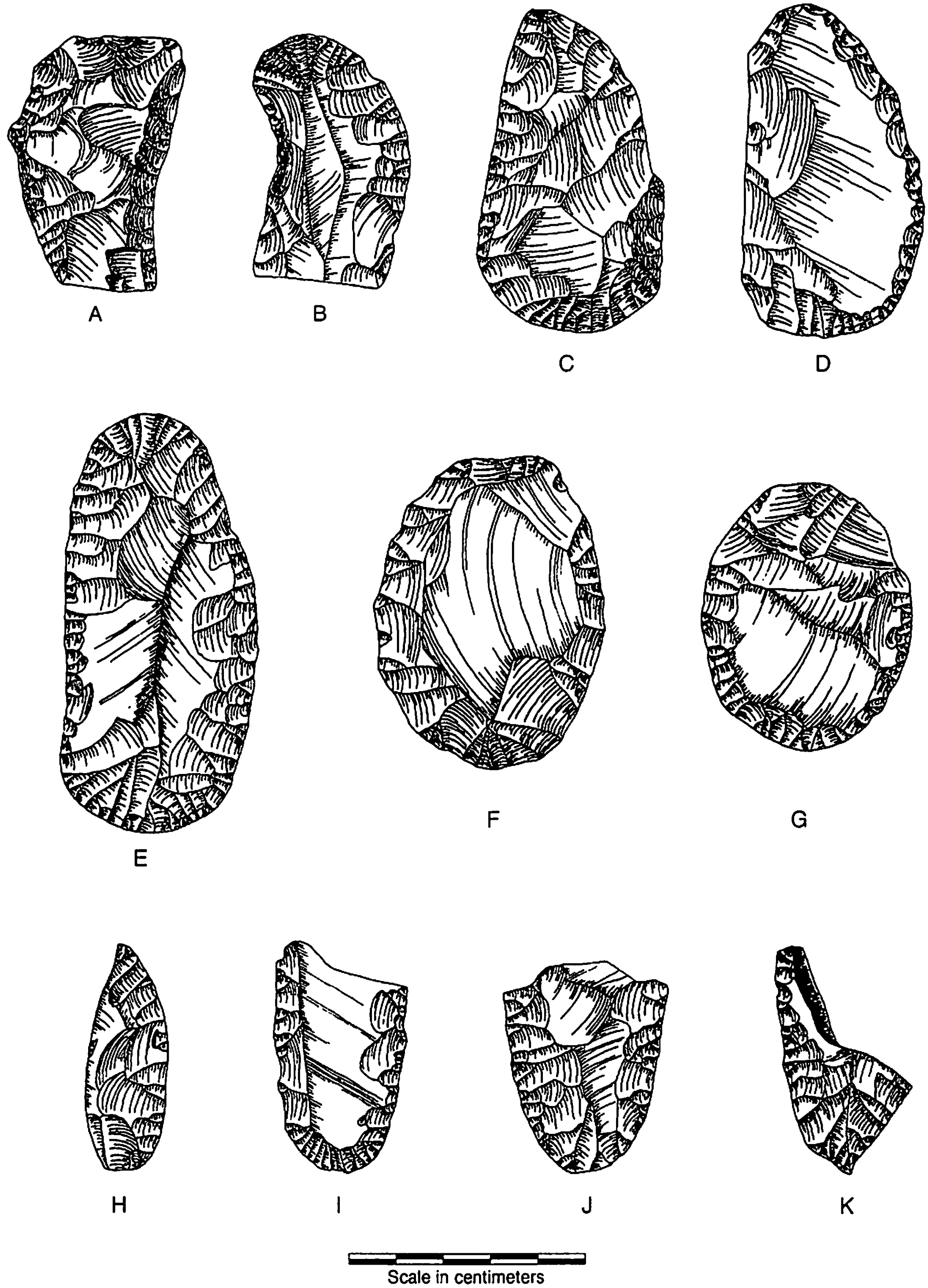


Figure 55. Obsidian plano-convex scrapers: (A) #157, obsidian, from square S12-L3, depth 13"; (B) #121, obsidian, from square S12-L4, depth 6"; (C) #201, obsidian, from square S30-R1, depth 12 to 16"; (D) #163, obsidian, from square S8-L1, depth 14"; (E) #114, obsidian, from control block of Stratigraphic Block #3, depth 18"; (F) #119, obsidian, from square S12-L2, depth 17"; (G) #16, obsidian, from square S41-L3, depth 12 to 16"; (H) #224, obsidian, broken, possibly a burin spall from a concave scraper-burin core, from square S11-L2, depth 4 to 6"; (I) #847, obsidian, broken, from square S6-L2, depth 4 to 8"; (J) #356, obsidian, broken, from square S12-R1, depth 4 to 8"; (K) #276, obsidian, broken, possibly a burin spall from a concave scraper-burin core, from square S20-R1, depth 4 to 8".

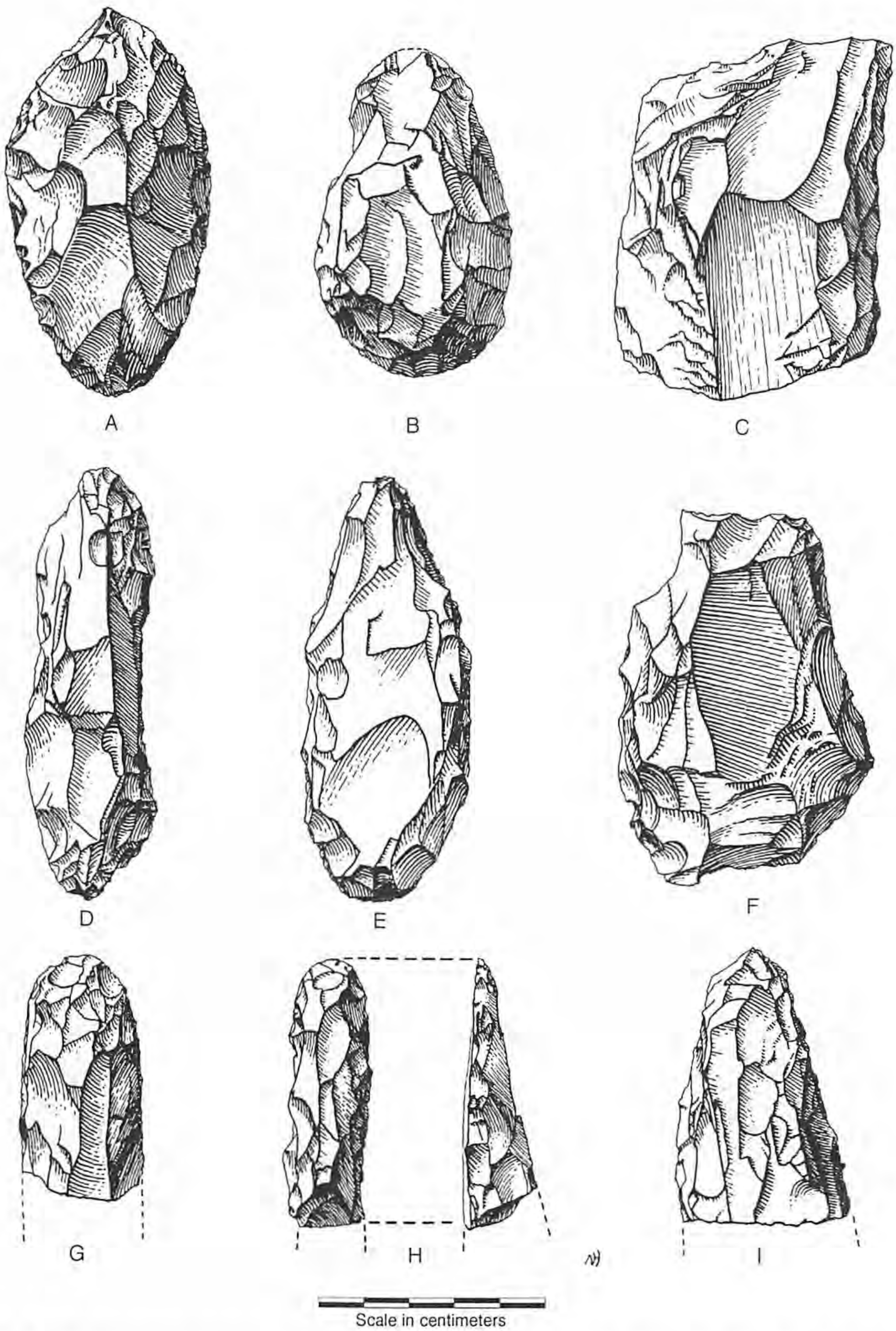


Figure 56. Basalt plano-convex scrapers: (A) #56, basalt, from square S11-L1, depth 0 to 4"; (B) #150, basalt, damaged in excavation, from square S50-L4, depth 11"; (C) #2, basalt, from square 0-S4, depth 8 to 12"; (D) #134, basalt, from square S6-L1, depth 8 to 10"; (E) #8, basalt, from square S10-L1, depth 10"; (F) #49, basalt, from square S12-L2, depth 4.5"; (G) #85, basalt, broken, from square S52-L6, depth 16 to 20"; (H) #198, top and side view, basalt, from square S9-L2, depth 7.5"; (I) #744, basalt, from square S10-R1, depth 8 to 12".

fragments: one of flint, three of obsidian, and six of basalt. They are widely distributed ranging from the surface to a depth of 20".

In general, the plano-convex scrapers are medium to large in size. The obsidian examples range from 3.3 to 7.0 cm, with an average size falling between 5.0 and 6.0 cm. The basalt specimens tend to be larger, ranging from 6.0 to 9.0 cm, with over half of them being toward the larger end of this range.

The distribution of obsidian (including the five flint specimens) scrapers according to depth is shown in Table 11.

The distribution of basalt scrapers according to depth is shown in Table 12. The obsidian specimens are more plentiful in level 4 while the basalt specimens are most abundant from level 3 upward.

There are 133 obsidian plano-convex scrapers; 32 are relatively whole specimens while 101 are represented by fragments. Examples of the obsidian plano-convex scrapers are shown in Figures 54 and 55. The horizontal distribution according to the various levels is shown in Figure 53.

The basalt plano-convex scrapers are represented by 18 specimens, 10 of which are complete. Figure 56 illustrates examples of the basalt scrapers. The site distribution according to the various levels is shown in Figure 57.

Striated Scrapers

In working with the artifacts from El Inga, it was noted that certain specimens exhibit fine scratches or striations upon one surface. Furthermore, specimens displaying this wear were reasonably consistent in form and sufficiently abundant to represent a characteristic artifact for the site; therefore, all examples, including broken fragments, have been placed in the same class and are designated as striated scrapers.

The typical striated scraper is represented by a relatively long and narrow flake, usually with some retouching along one or both edges in the midsection area. The unmodified surface displays fine striations, caused by wear, across the midsection or narrow section of the flake. The striated scraper was apparently used as a tool resembling a spokeshave or draw-knife. The retouching was done to sharpen the edge or to make the tool more effective as a draw-knife. Examples of striated scrapers are illustrated in Figure 58.

All of the examples classed in this group show fine striations; in some specimens the wear is slight while in others it is extensive and has dulled the shiny surface of the obsidian. It is not clear as to what agent produced the striations upon this particular tool. Although suitable for working wood or bone, these substances are not hard enough to scratch the obsidian, and laboratory attempts to create this effect by scraping wood or bone met with failure.

There is considerable variation in the class of striated scrapers in so far as form is concerned. Some specimens have retouching on both edges so that the flake is quite constricted in the midsection (Fig. 58A); others have retouching only along one edge (Fig. 58E). Also, some examples are represented by heavy triangular sectioned flakes of suitable form which served this purpose without retouching (Fig. 58I). A number of specimens is broken, commonly at the midpoint, apparently from strain in this area during usage (Fig. 58J–M). Broken pieces were commonly reworked at the ends to produce a burin by the removal of one or more burin spalls (Fig. 58M–N). There are also some secondary burin spalls derived from striated scrapers (Fig. 59B–D). Other fragments include midsections or irregular pieces too small for salvage, but, nonetheless, are recognizable as portions from striated scrapers (Fig. 59F–G).

There is a total of 82 striated scrapers from the excavations. Of these, 30 are relatively complete, 7 show burin facets, 4 are secondary burin spalls,

Table 11. Vertical distribution of obsidian plano-convex scrapers.

Depth in inches	Plano-convex scrapers (obsidian)
0 to 4	10
4 to 8	26
8 to 12	39
12 to 16	48
16 to 20	11
20 to 24	4
Total	138

Table 12. Vertical distribution of basalt plan-convex scrapers.

Depth in inches	Plano-convex scrapers (basalt)
0 to 4	4
4 to 8	4
8 to 12	7
12 to 16	2
16 to 20	1
20 to 24	
Total	18

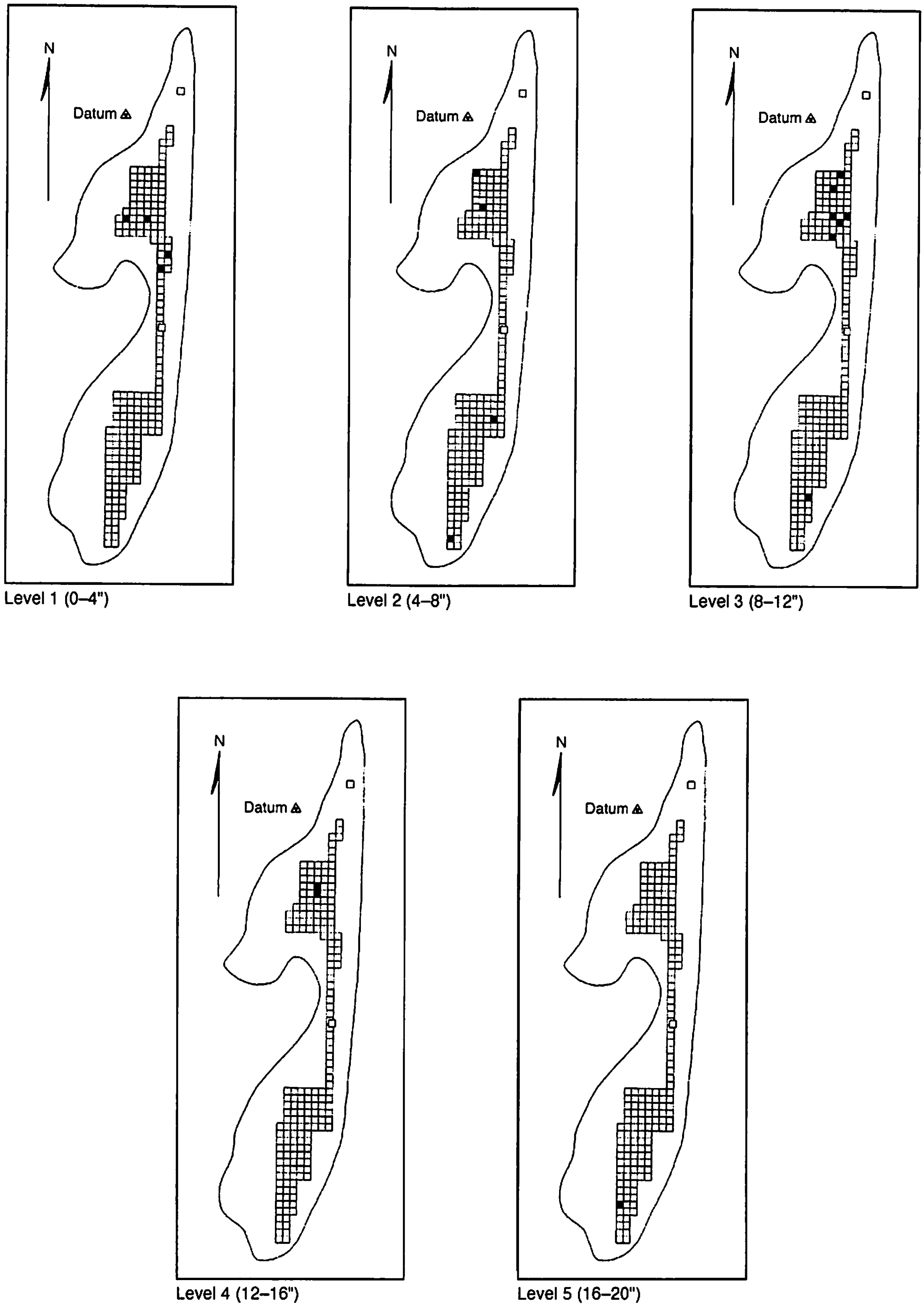


Figure 57. Distribution of basalt plano-convex scrapers by level.

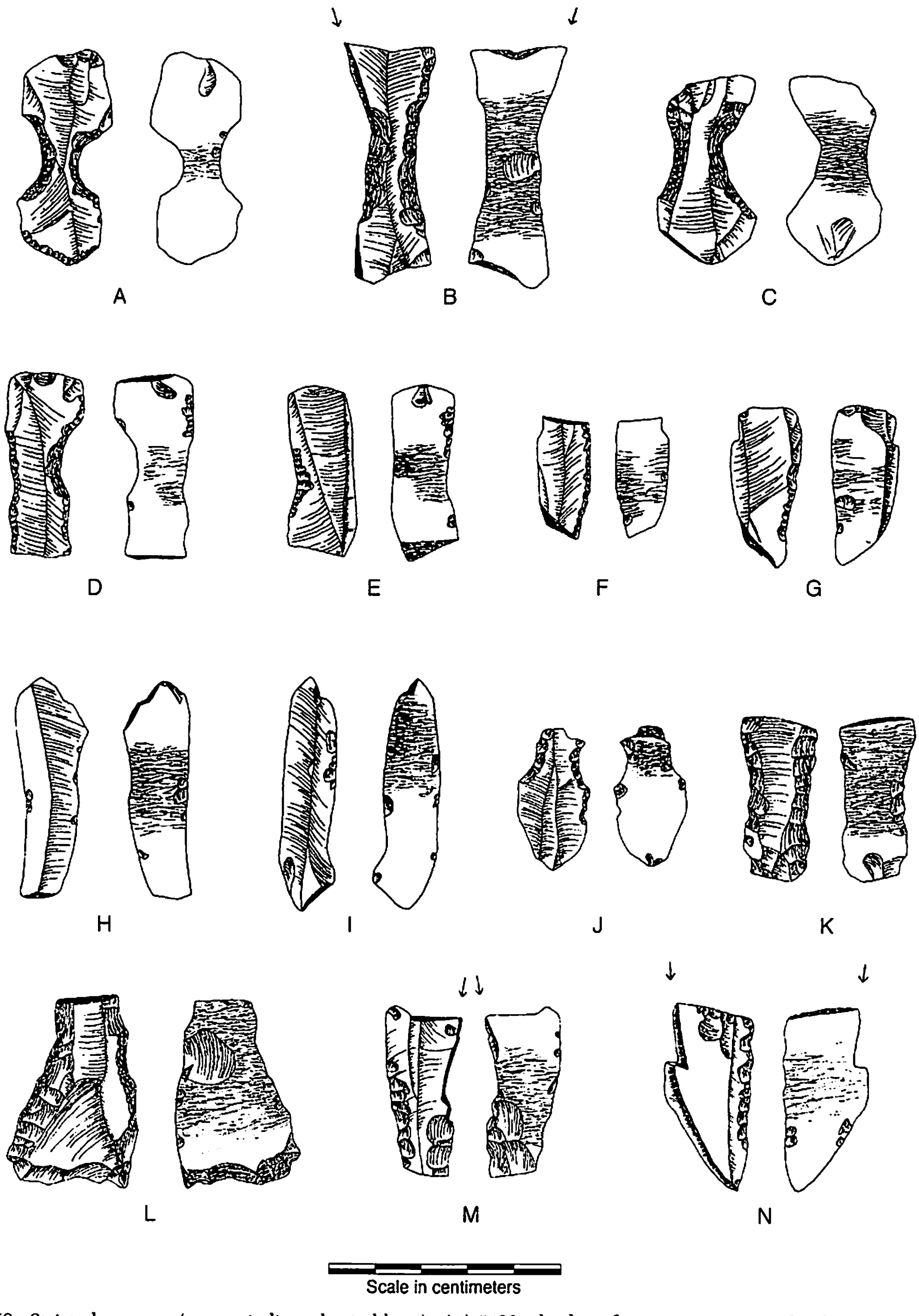


Figure 58. Striated scrapers (arrows indicate burin blows): (A) #498, obsidian, from square S2-R1, depth 4 to 8"; (B) #491, obsidian, from square O-S4, depth 4 to 8"; (C) #652, obsidian, from square S51-L6, depth 0 to 4"; (D) #224, obsidian, from square S11-L2, depth 4 to 6"; (E) #867, obsidian, from square S44-L3, depth 4 to 8"; (F) #857a, obsidian, from square S7-R1, depth 4 to 8"; (G) #669, obsidian, from square S30-R1, depth 8 to 12"; (H) #857b, obsidian, from square S7-R1, depth 4 to 8"; (I) #325, obsidian, from square S41-L2, depth 8 to 12"; (J) #416, obsidian, broken in half, from square S46-L6, depth 4 to 8"; (K) #794, obsidian, from square S4-L2, depth 4 to 8"; (L) #282, obsidian, broken in half, from square S37-L4, depth 8 to 12"; (M) #531, obsidian, broken in half, from square S56-L5, depth 0 to 4"; (N) #271, obsidian, from square S23-R1, depth 0 to 4". Illustrations show both front and back views. Striations are indicated upon the right figure or back view.

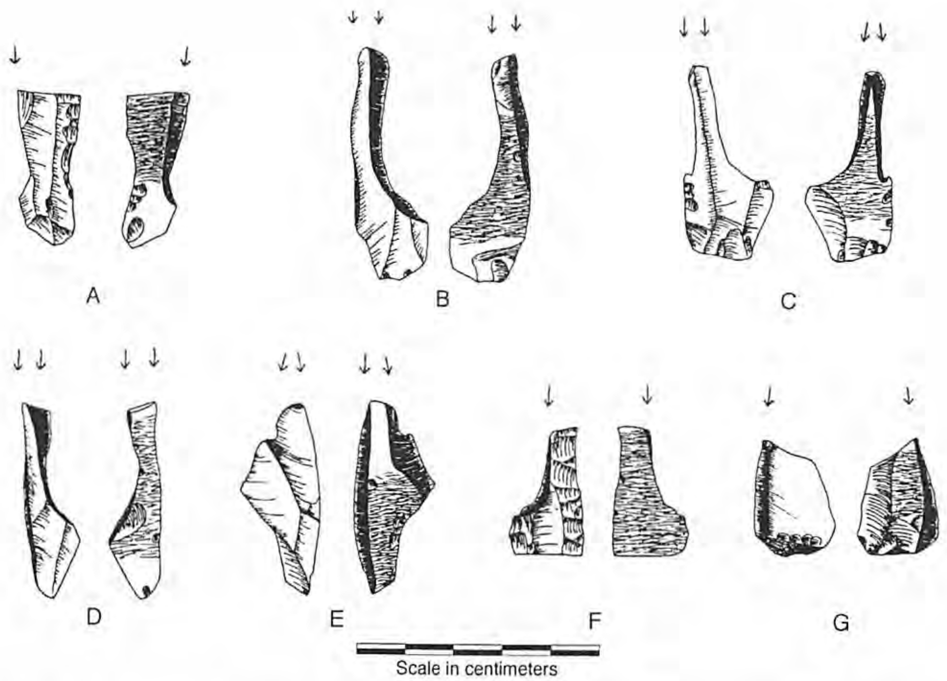


Figure 59. Striated scraper fragments showing both front and back views. Striations are indicated upon the right figure or back view. Arrows indicate burin blows. Striated scraper fragments: (A) #877, obsidian, from square S9-R1, depth 4 to 8"; (B) #498, obsidian, from square S2-Rl, depth 4 to 8"; (C) #352, obsidian, from square 0-S8, depth 4 to 8"; (D) #748, obsidian, from square S10-R1, depth 4 to 8"; (E) #299, obsidian, from square N2-R2, depth 8 to 12"; (F) #537, obsidian, from square S47-L6, depth 8 to 12"; (G) #565, obsidian, from square S3-R1, depth 4 to 8".

and 41 are miscellaneous fragments. One specimen, a midsection fragment from level 3 (8 to 12"), is made of flint. It does not show striations, as on the obsidian, but is worn in the same area and was used for the same purpose. All other specimens are made of obsidian.

The distribution according to depth is shown in Table 13. The specimens are most abundant in the upper levels, and none were found in levels 5 or 6. The horizontal distribution according to depth is shown in Figure 60. The striated scrapers are more abundant at the southern end of the excavations, particularly in levels 3 and 4. This distribution resembles that of the concave flake scrapers previously discussed.

Concave Scraper-burin Cores

There are 64 artifacts that are designated as concave scraper-burin cores. Although an awkward designation, it attempts to describe the nature of the artifact. In first working over the El Inga material, most of these specimens were thought to be broken scrapers; however, with more careful examination and study of individual examples, they proved to represent burins or burin cores for the production of burin spalls. The manufacturing process is quite clear as examples are available illustrating all stages of production. It is not especially clear, however, as to whether the burin end or the burin spall represents the desired product. Some burins show use as a chisel-like instrument where minute flakes have been broken from the cutting edge. Also, some of the burin spalls show, by the presence of striations or chipped edges, that they were used as a scraping tool. Obviously, both the burin and the burin spalls were utilized.

As an aid in describing this distinctive artifact, a series of idealized drawings is shown in Figure 61. This illustrates the prepared concave end core, the removal of primary and secondary burin spalls, and the final exhausted nucleus.

The El Inga specimens vary considerably in

Table 13. Vertical distribution of striated scrapers.

Depth in inches	Striated scrapers
0 to 4	18
4 to 8	35
8 to 12	24
12 to 16	5
16 to 20	0
20 to 24	0
Total	82

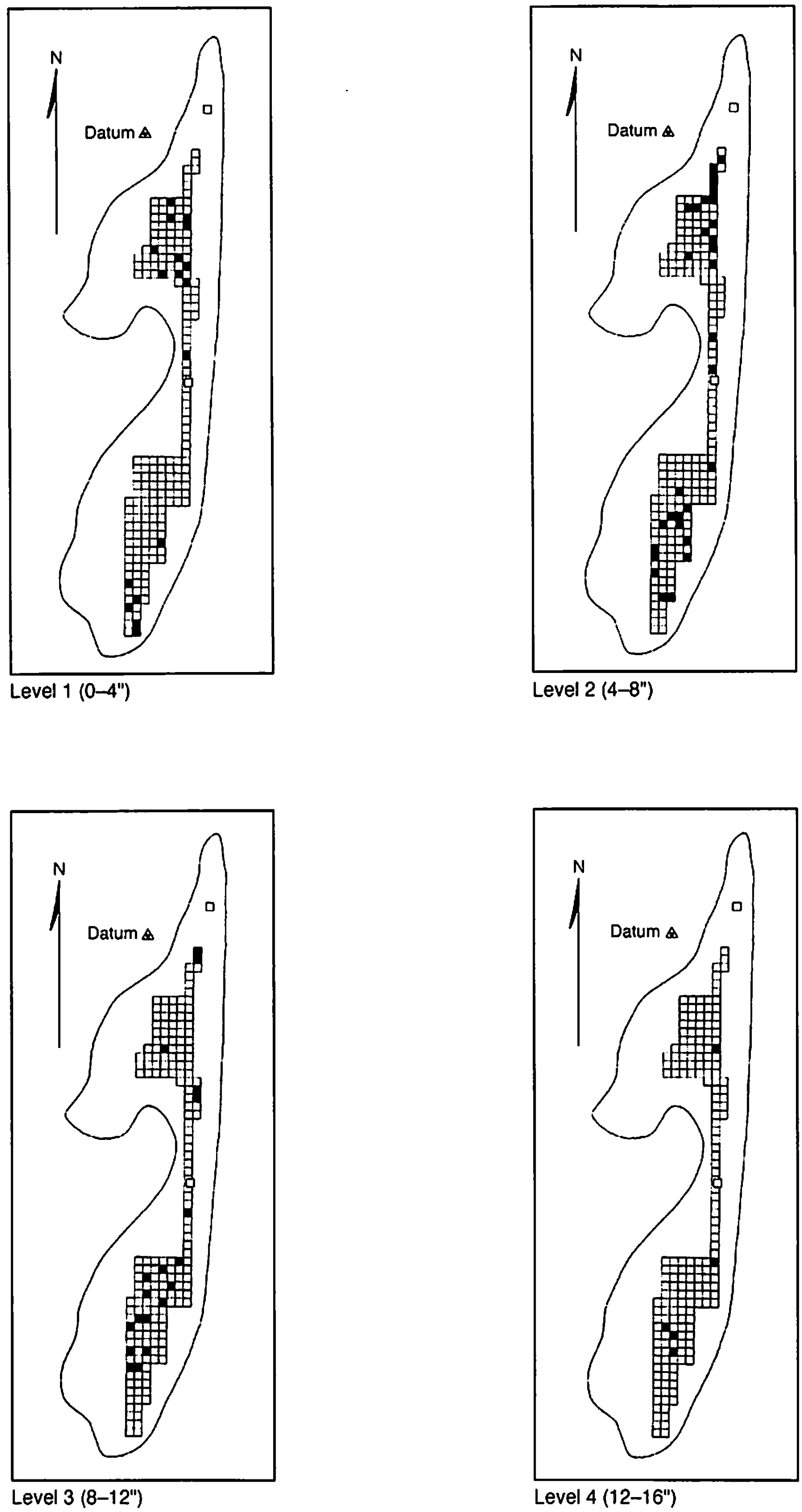


Figure 60. Distribution of striated scrapers by level.

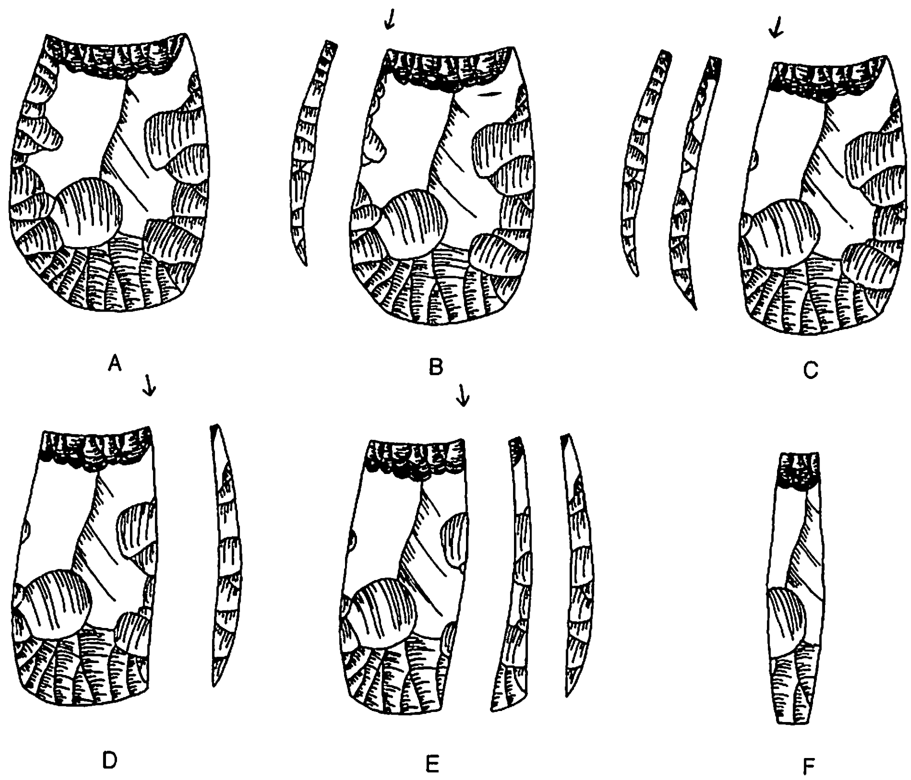


Figure 61. Idealized sketch to show continuous production of burin spalls from a concave scraper-burin core (arrows indicate burin blows): (A) concave scraper-burin core; (B) concave scraper-burin core with primary burin spall removed from the left side; (C) concave scraper-burin core with secondary burin spall removed from the left side; (D) concave scraper-burin core with primary burin spall removed from the right side; (E) concave scraper-burin core with secondary burin spall removed from the right side; (F) exhausted concave scraper-burin core after removal of burin spalls from both sides.

form and the amount of preparation or trimming. A large flake was selected, and a thick one seems to have been preferred although thin examples were used. The end was then retouched to produce a concave area with steep short flakes forming a flattened or truncated area which functioned as a striking platform for the removal of burin spalls. The rest of the flake was partly shaped in most cases; however, it varies from lightly chipped edges to those in which the whole surface has been flaked to resemble an ovate plano-convex scraper. A burin blow was then applied to the concave end or truncation to remove a primary burin spall. These have been removed from both sides of the truncation although they are most commonly taken only from the thickest edge. Later, additional burin spalls or secondary burin spalls were removed until the core could no longer be used. In some cases, burin spalls were removed from both ends of the core. Examples illustrating various forms of concave scraper-burin cores are shown in Figures 62 and 63. The primary and secondary burin spalls derived from these cores are discussed under Burin Spalls.

All of the specimens are made of obsidian, and a number of them have been broken. Complete specimens range between 4.0 and 8.1 cm with most of them falling between 4.0 and 6.0 cm. One specimen displays considerable wear and striations at one corner (Fig. 62C), but this is unique example.

The distribution of concave scraper-burin cores according to depth is shown in Table 14.

Table 14. Verical distribution of concave scraper-burin cores.

Depth in inches	Concave scraper-burin cores
0 to 4	9
4 to 8	14
8 to 12	25
12 to 16	16
16 to 20	0
20 to 24	0
Total	64

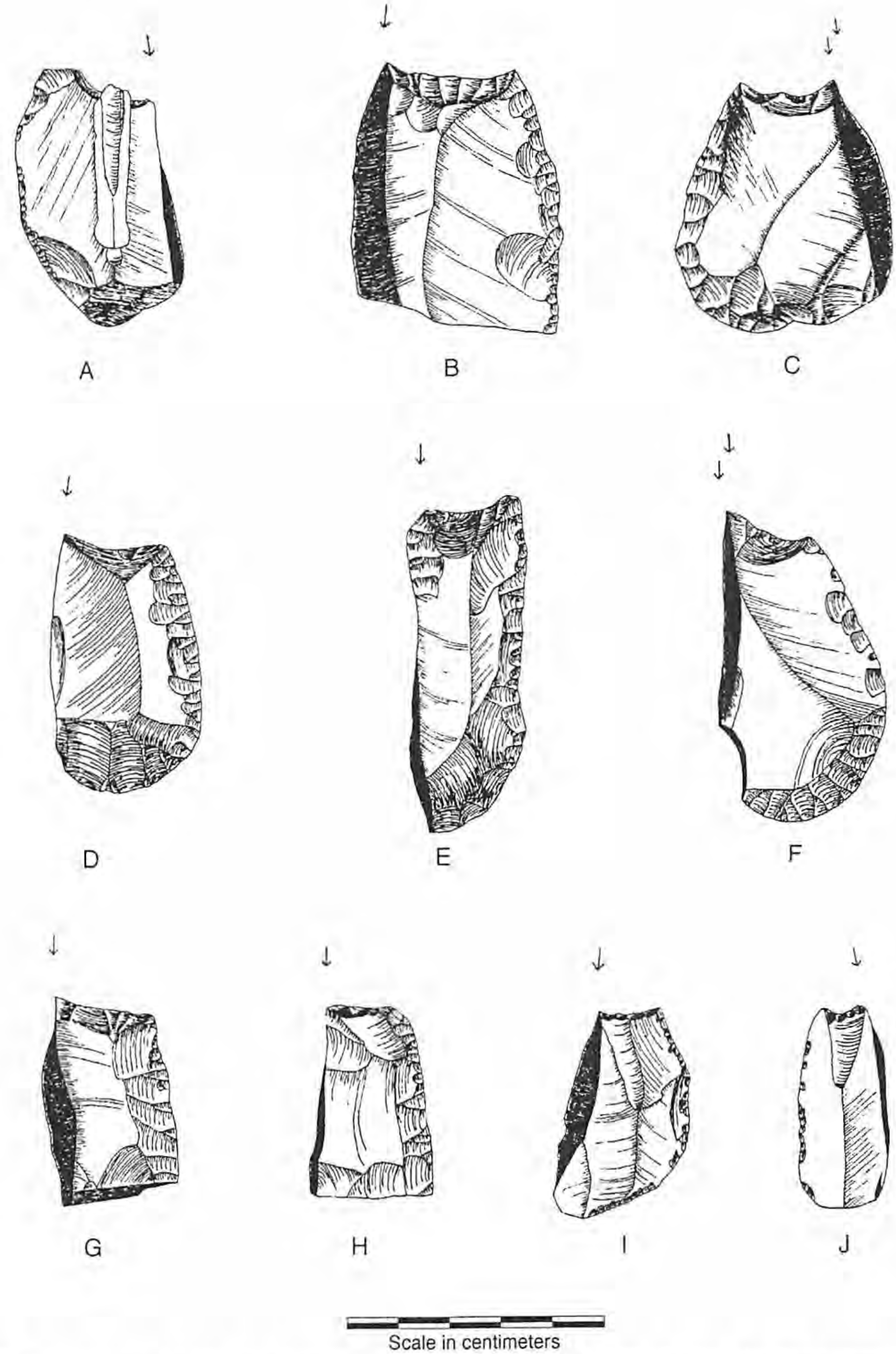


Figure 62. Concave scraper-burin cores (arrows indicate burin blows): (A) #699, obsidian, the long narrow flake shown in center of this specimen is separate and can be replaced on parent core (it is of interest as it indicates a thinning of core before concave truncation was prepared to receive burin blow), both pieces from square S10-L1, depth 8 to 12"; (B) #148, obsidian, from square S12-L2, depth 4.5"; (C) #115, obsidian, striations and abrasions from use appear on upper left corner, from square 0-R1, depth 12.5"; (D) #160, obsidian, from square S44-L2, depth 11"; (E) #604, obsidian, from square S40-L1, depth 8 to 12"; (F) #19, obsidian, from square S10-L2, depth 6"; (G) #224, obsidian, apparently broken, from square S11-L2, depth 4 to 6"; (H) #744, obsidian, apparently broken, from square S10-R1, depth 8 to 12"; (I) #326, obsidian, from square S41-L2, depth 12 to 16"; (J) #443, obsidian, from square S7-L2, depth 0 to 4".

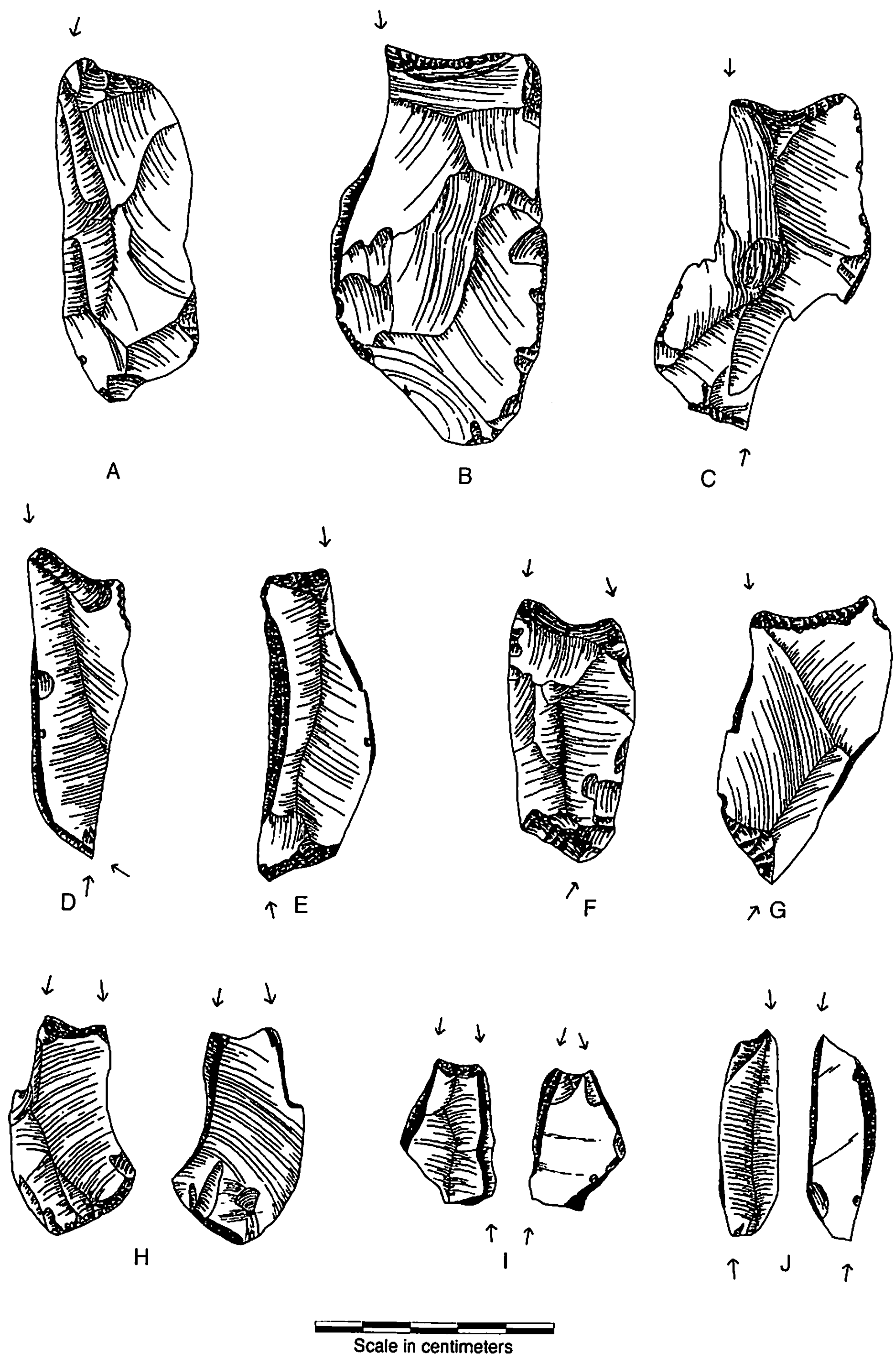


Figure 63. Concave scraper-burin cores (arrows indicate burin blows): (A) #268, obsidian, from square S39-R1, depth 8 to 12"; (B) #801, obsidian, from square S8-L1, depth 8 to 12"; (C) #873, obsidian, from square S5-L3, depth 0 to 4"; (D) #611, obsidian, from square S40-L1, depth 12 to 16"; (E) #821, obsidian, from square S6-R1, depth 8 to 12"; (F) #457, obsidian, from square S52-L4, depth 4 to 8"; (G) #110, obsidian, from square 0-S38, depth 12 to 14"; (H) #444, obsidian, front and back view, from square S7-L2, depth 4 to 8"; (I) #458, obsidian, front and back view, from square S13-L4, depth 0 to 4"; (J) #692, obsidian, front and back view, from square S36-L3, depth 8 to 12".

They are most abundant in level 3 (8 to 12"), and none were found below level 4 (12 to 16").

The horizontal distribution at the various levels is shown in Figure 64. They are more abundant in the south section of the site in level 4, and the general distribution pattern resembles that of the striated scrapers which are sometimes marked by burin facets.

Burins

There is a total of 69 burins from the El Inga excavations. All of them are made from obsidian except one specimen made of flint found in level 2 (4 to 8"). Some of them are apparently broken although irregular or broken pieces of obsidian were used for burins, and it is not always possible to tell if the specimen is broken or if it was produced from a broken flake. Some of the burin edges appear to have been used, for minute flakes have dulled the cutting edge; others appear sharp and unworn. The length ranges from 1.9 to 8.2 cm with most examples falling between 3.0 and 4.0 cm.

The burins appear in several forms although the differences do not appear to be significant in terms of site distribution, either vertically or horizontally. Consequently, all burins are grouped together on tables or figures showing their distribution. There are basically three varieties of burins represented: an angle burin made upon a break, an angle burin made upon a prepared platform or truncation, and dihedral angle burins. Examples of El Inga burins are illustrated in Figures 65 and 66.

There are 45 examples of angle burins made on a break, and these represent the most common variety. In this type the flat surface provided by a break served as the striking platform for removal of the burin spall. The burin spall was most commonly removed from the thickest edge of the flake, but some examples are present in which burin spalls have been removed from both edges or even both ends. Some of the specimens are made from unmodified flakes while others are produced on pieces of flake scrapers or other artifacts. Examples of angle burins made upon a break are shown in Figure 65.

There are 17 angle burins in which the burin facet has been struck from a steeply chipped retouched edge or truncation (Fig. 66A–G). This retouching apparently served to prepare the striking platform for removal of the burin spall. Most specimens have burin spalls removed from one edge only although both ends and sides of the flake were sometimes utilized.

Table 15. Verical distribution of burins.

Depth in inches	Burins
0 to 4	11
4 to 8	16
8 to 12	22
12 to 16	17
16 to 20	2
20 to 24	1
Total	69

The dihedral angle burins are represented by seven specimens. In this form the burin edge is formed by the intersection of two burin facets at an acute angle to produce a V-shaped cutting edge. Examples of dihedral angle burins are shown in Figure 66J–M.

The distribution of burins according to the various levels in the site is shown in Table 15. They are most abundant in level 3 (8 to 12") but are plentiful in all of the top four levels. Three specimens occur at greater depths and are from the deepest section of the site. The horizontal distribution of burins according to the various levels is shown in Figure 67. They appear in all sections of the excavation but are concentrated in the southern area in level 4 (12 to 16").

Primary Burin Spalls

Primary burin spalls are represented by a total of 293 specimens, all made of obsidian. This count includes both whole specimens and fragments. The primary burin spall represents the first flake struck off by a burin blow; consequently, it is a long narrow flake that is triangular in cross section. The burin facet is evident on one face and this shows which side was removed from the burin core. In the series from El Inga, most of the primary burin spalls were apparently removed from concave scraper-burin cores, for they display the prepared striking platform and retouching along the edge. Out of the 293 specimens, only 25 examples lack the retouching along the edge; these are apparently from ordinary angle burins in which the original flake was unworked at the time the burin spall was removed. Among the worked specimens many show the corner of the prepared concave truncation along with the trimmed edge as illustrated in the idealized drawing in Figure 61B. Other whole specimens have such a small striking platform that it is not known as to whether the burin spall was taken from a break or a prepared truncation. The secondary trimming along the edge, however, suggests that they were derived from

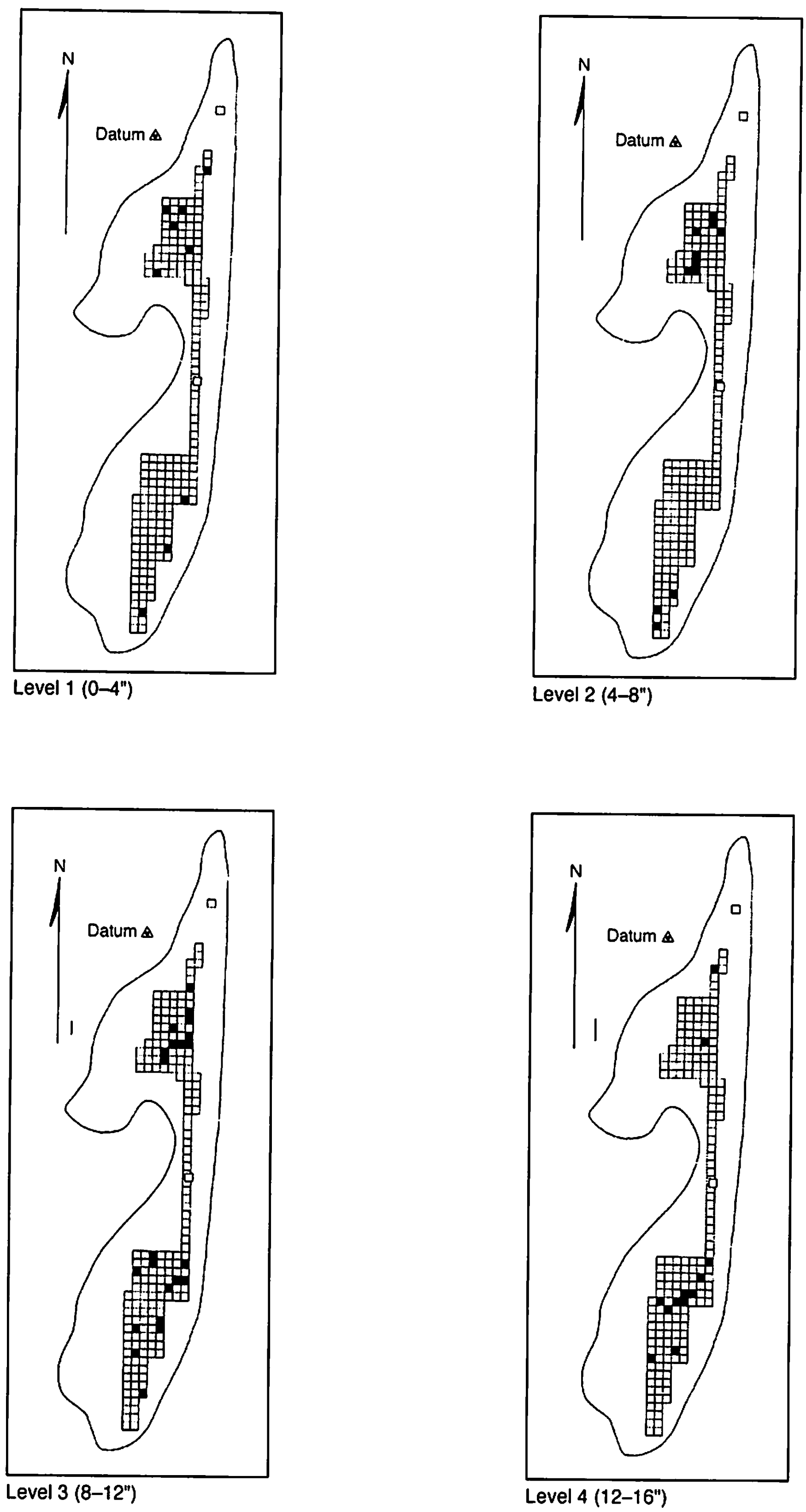


Figure 64. Distribution of concave scraper-burin cores by level.

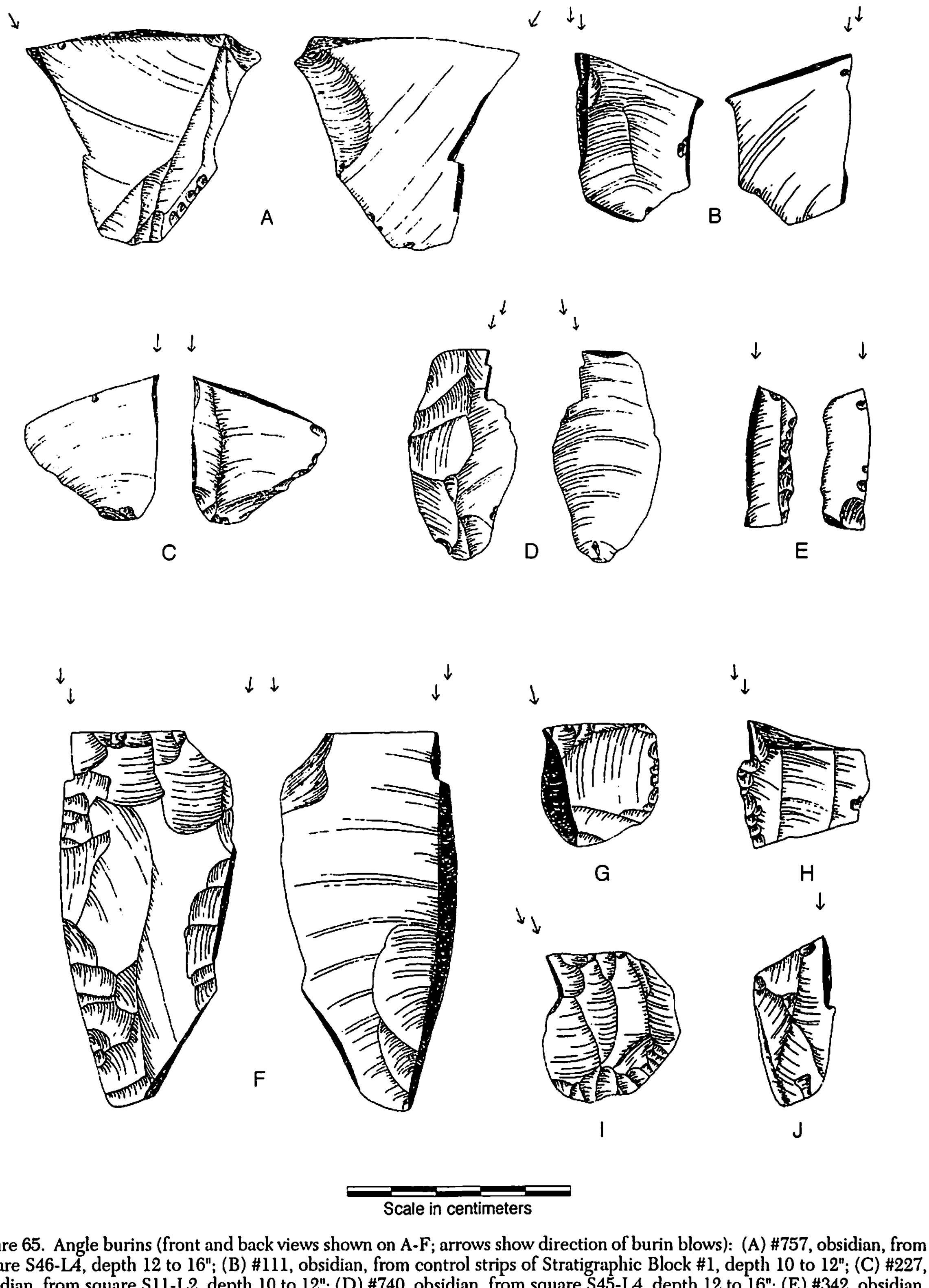


Figure 65. Angle burins (front and back views shown on A-F; arrows show direction of burin blows): (A) #757, obsidian, from square S46-L4, depth 12 to 16"; (B) #111, obsidian, from control strips of Stratigraphic Block #1, depth 10 to 12"; (C) #227, obsidian, from square S11-L2, depth 10 to 12"; (D) #740, obsidian, from square S45-L4, depth 12 to 16"; (E) #342, obsidian, from square S28-R1, depth 4 to 8"; (F) #693, obsidian, from square S40-R1, depth 8 to 12"; (G) #31, obsidian, from square 0-S37, depth 12 to 14"; (H) #787, obsidian, from square S48-L3, depth 4 to 8"; (I) #662, obsidian, from square S42-L4, depth 12 to 16"; (J) #581, obsidian, from square S45-L3, depth 12 to 16".

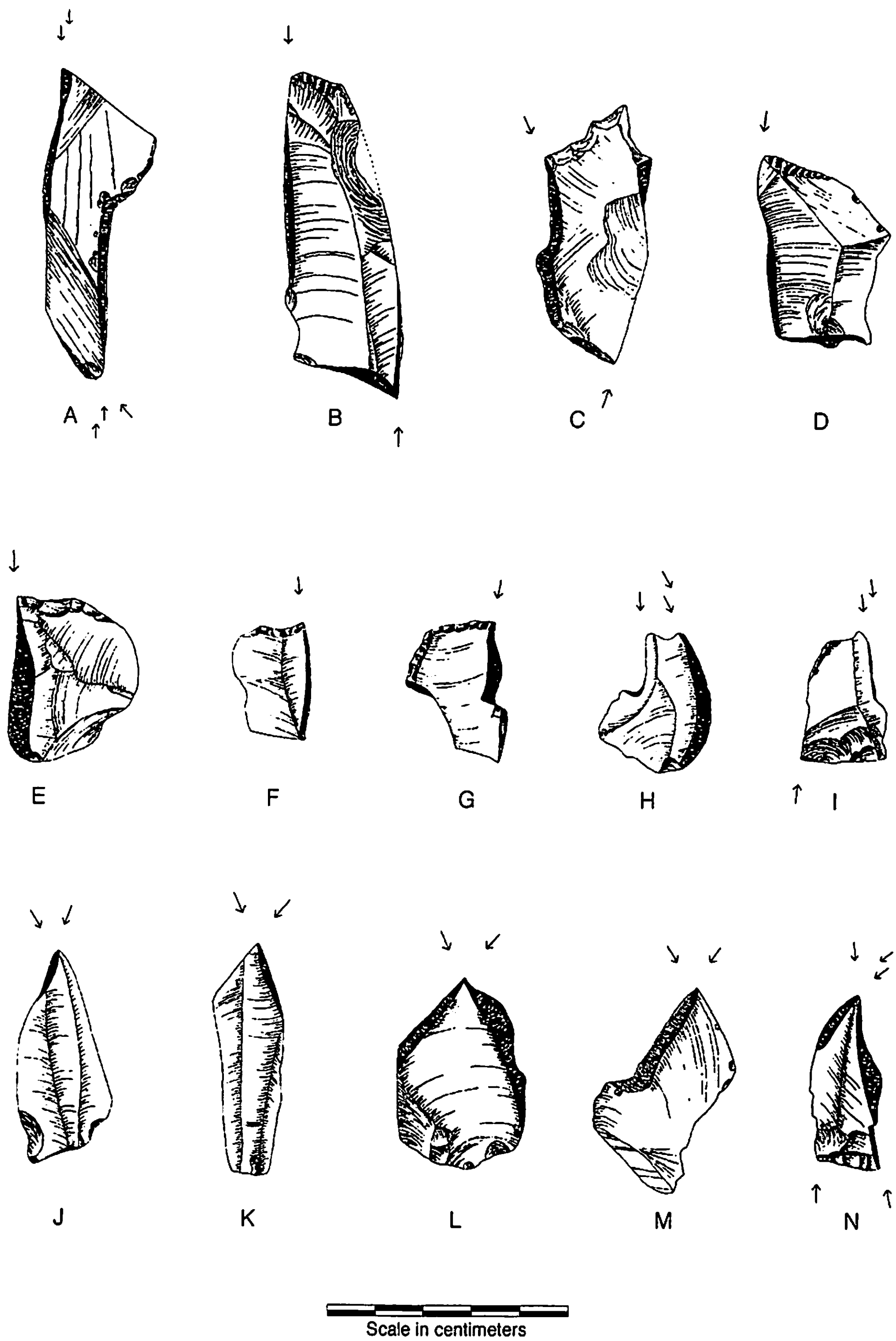


Figure 66. Burins (arrows indicate direction of burin blows): (A) #627, obsidian, from square S48-L6, depth 12 to 16"; (B) #233, obsidian, damaged in excavation, from square S12-L2, depth 18 to 20", Stratigraphic Block #3; (C) #763, obsidian, from square 0-S39, depth 8 to 12"; (D) #740, obsidian, from square S45-L4, depth 12 to 16"; (E) #627, obsidian, from square S48-L6, depth 12 to 16"; (F) #565, obsidian, from square S3-R1, depth 4 to 8"; (G) #620, obsidian, from square Test Pit 1B, depth 4 to 8"; (H) #306, obsidian, from square S40-L3, depth 8 to 12"; (I) #721, obsidian, from square S4-L3, depth 0 to 4"; (J) #282, obsidian, from square S37-L4, depth 8 to 12"; (K) #789, obsidian, from square Test Pit 2B, depth 4 to 8"; (L) #211, obsidian, from square S11-L1, depth 6 to 8", Stratigraphic Block #3; (M) #559, obsidian, from square S47-L3, depth 12 to 16"; (N) #322, obsidian, from square S16-R1, depth 4 to 8".

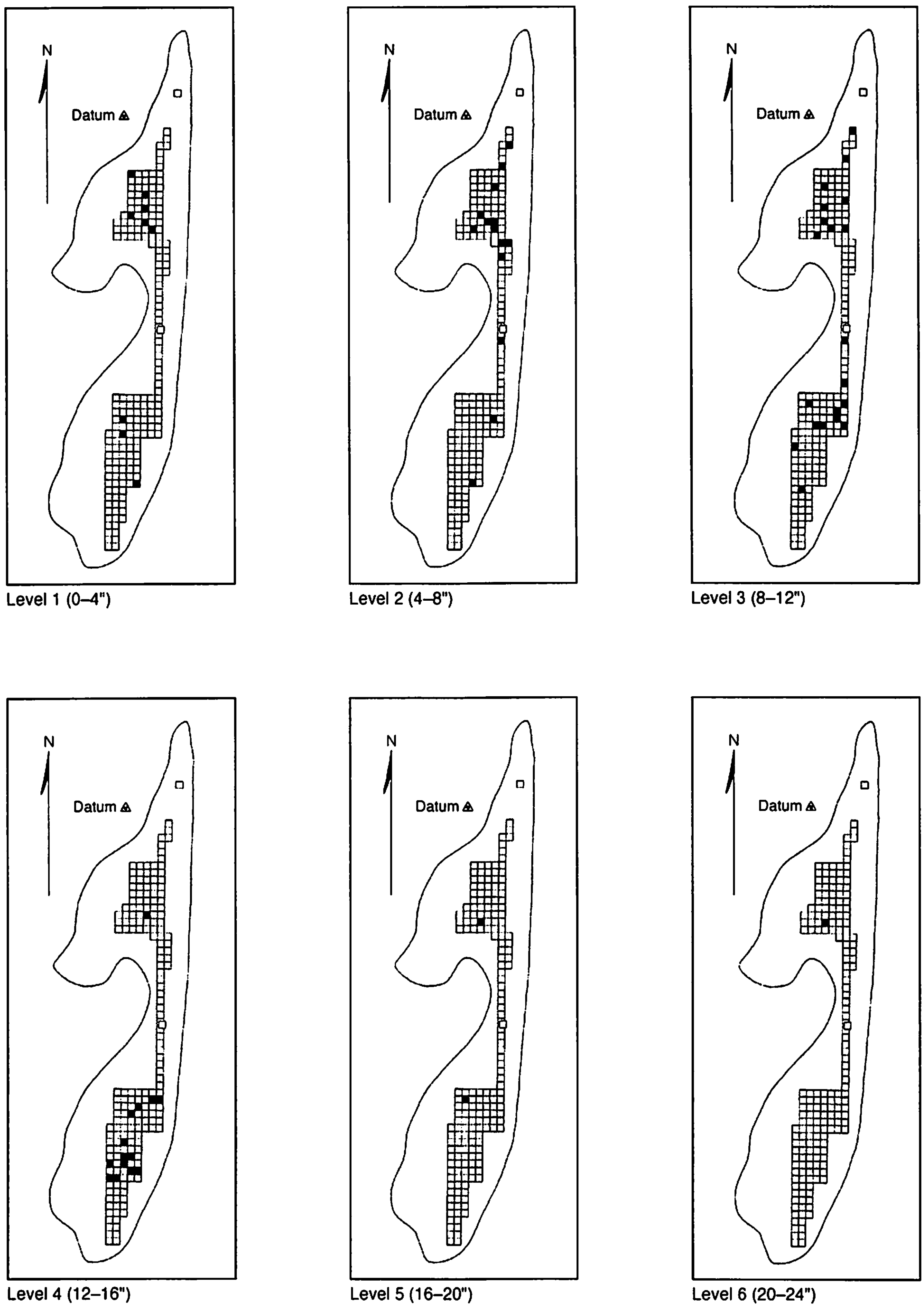


Figure 67. Distribution of burins by level.

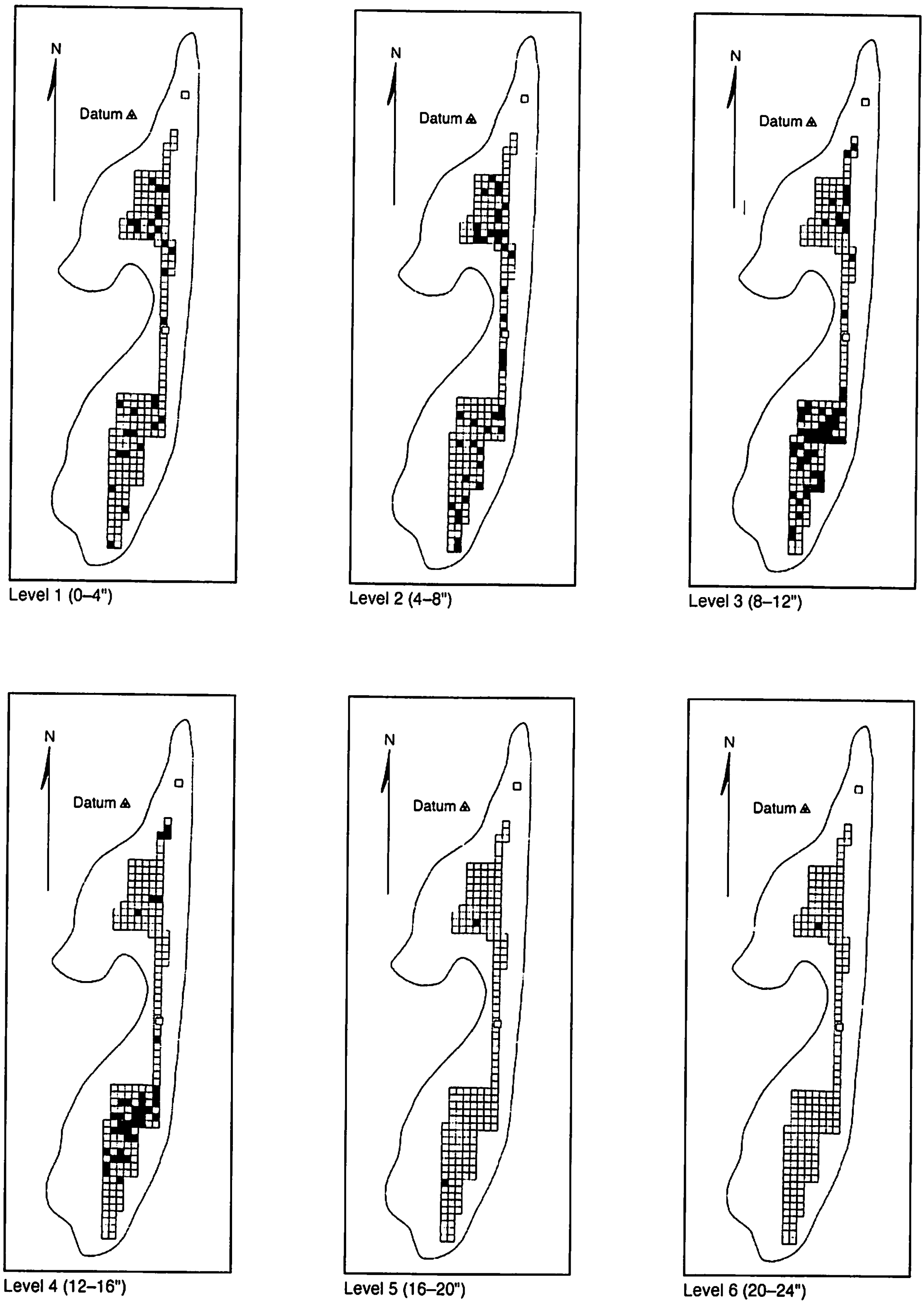


Figure 68. Distribution of primary burin spalls by level.

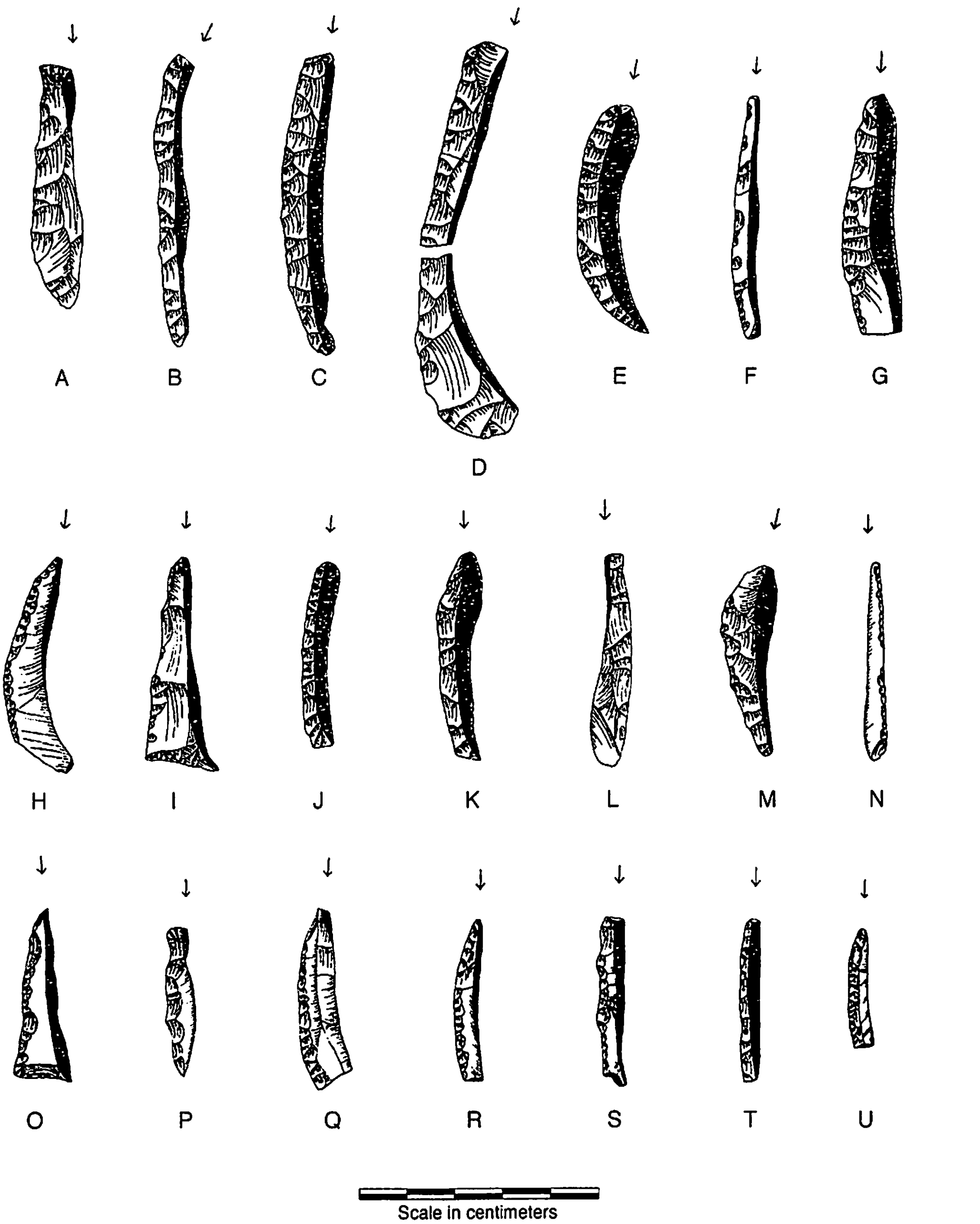


Figure 69. Primary burin spalls (arrows indicate direction of burin blows): (A) #672, obsidian, from square S55-L6, depth 8 to 12"; (B) #286, obsidian, from square S36-R1, depth 12 to 16"; (C) #110, obsidian, from square 0-S38, depth 12 to 14"; (D) discovered in three fragments and restored in laboratory, obsidian (top fragment #803 from square S44-L5, depth 12 to 16"; midsection, #523, from square S42-L6, depth 8 to 12"; lower section, #599, from square S47-L2, depth 8 to 12"); (E) #662, obsidian, from square S42-L4, depth 12 to 16"; (F) #781, obsidian, from square S40-L2, depth 8 to 12"; (G) #286, obsidian, from square S36-R1, depth 12 to 16"; (H) #734, obsidian, from square S40-L4, depth 8 to 12"; (I) #730, obsidian, from square S37-R1, depth 12 to 16"; (J) #289, obsidian, from square S7-L1, depth 8 to 12"; (K) #747, obsidian, from square S48-L3, depth 8 to 12"; (L) #641, obsidian, from square S41-L1, depth 12 to 16"; (M) #611, obsidian, from square S40-L1, depth 12 to 16"; (O) #280, obsidian, from square S39-L2, depth 12 to 16"; (P) #797, obsidian, from square S38-L4, depth 12 to 16"; (Q) #641, obsidian, broken, from square S41-L1, depth 12 to 16"; (R) #415, obsidian, broken, from square S43-L2, depth 12 to 16"; (S) #395, obsidian, broken, from square 0-S9, depth 0 to 4"; (T) #328, obsidian, broken, from square S13-L2, depth 4 to 8"; (U) #807, obsidian, broken, from square S44-L5, depth 8 to 12".

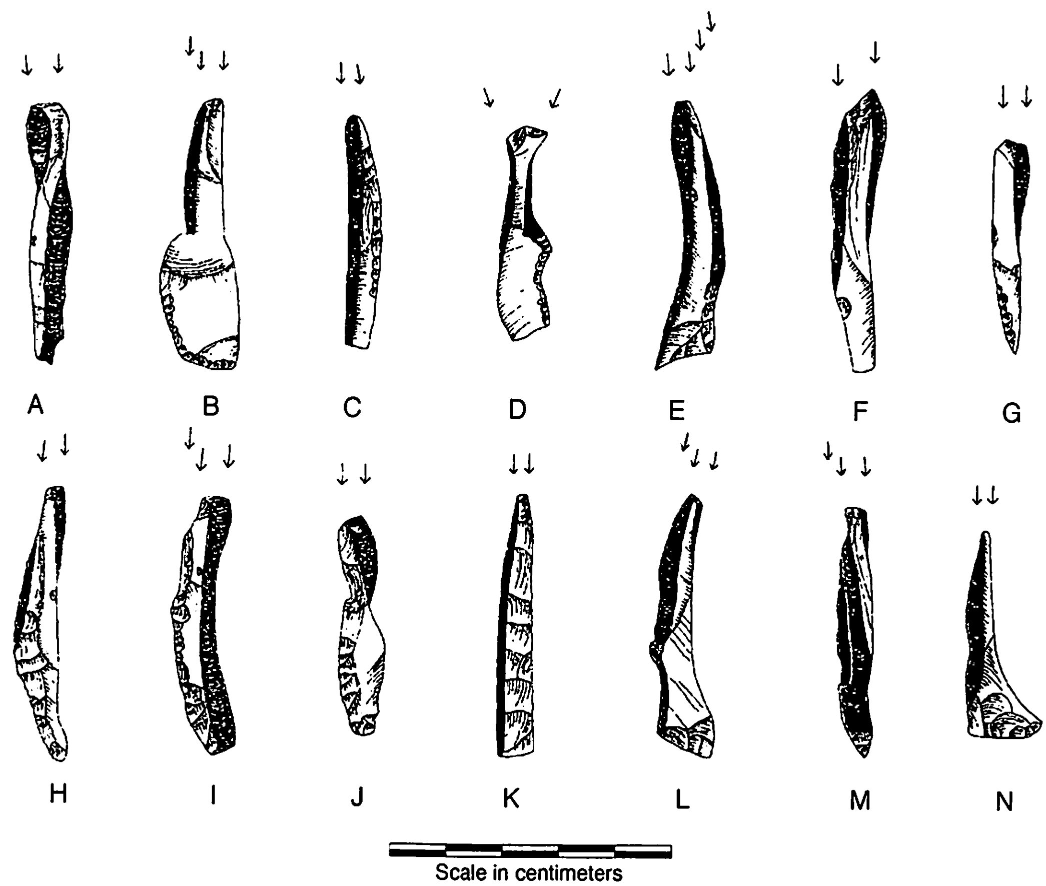


Figure 70. Secondary burin spalls (arrows indicate direction of burin blows): (A) #606, obsidian, from square 0-R2, depth 12 to 16"; (B) #730, obsidian, from square S37-R1, depth 12 to 16"; (C) #455, obsidian, from square S56-L6, depth 8 to 12"; (D) #499, obsidian, from square S2-R1, depth 8 to 12"; (E) #288, obsidian, from square S7-L1, depth 4 to 8"; (F) #109, obsidian, from square 0-S38, depth 10 to 12"; (G) #721, obsidian, from square S4-L3, depth 0"to 4"; (H) #744, obsidian, from square S10-R1, depth 8 to 12"; (I) #282, obsidian, from square S37-L4, depth 8 to 12"; (J) #298, obsidian, from square S44-L2, depth 8 to 12"; (K) #280, obsidian, from square S39-L2, depth 12 to 16"; (L) #148, obsidian, from square S12-L2, depth 4.5"; (M) #352, obsidian, from square 0-S8, depth 4 to 8"; (N) #30, obsidian, from square 0-S37, depth 10 to 12".

concave scraper-burin cores. A number of specimens are broken, and the area of the striking platform is missing.

An effort was made to discover a primary burin spall which could be replaced upon the original concave scraper-burin core from which it had been removed, but this has been unsuccessful. One primary burin spall could be matched with a secondary burin spall (Fig. 71A), but the whole artifact could not be reassembled. The matched spalls, however, are obviously derived from a concave scraper-burin core.

It is not clear as to whether the primary burin spalls are refuse material from manufacturing burins, or whether the burin spall was desired for some purpose. The retouching present along the edge is derived from the burin core from which the burin spall was struck, and very few specimens show any indication of use after removal. In four examples, however, the burin facet shows slight striations or scratches to indicate some usage, but this is rare.

Examples of primary burin spalls from El Inga are illustrated in Figure 69. The specimens range in length from 1.3 to 6.7 cm, most of them falling between 2.0 and 4.0 cm. Many of the specimens have a slight curve or are slightly twisted where the burin blow did not produce a straight, flat spall.

The distribution of primary burin spalls according to their depth at the site is given in Table 16. They are most abundant in level 3 with only three examples deeper that level 4. The horizontal distribution according to the various levels

Table 16. Vertical distribution of primary burin spalls.

Depth in inches	Primary burin spalls
0 to 4	40
4 to 8	54
8 to 12	110
12 to 16	86
16 to 20	2
20 to 24	1
Total	293

Table 17. Vertical distribution of secondary burin spalls.

Depth in inches	Secondary burin spalls
0 to 4	35
4 to 8	59
8 to 12	149
12 to 16	103
16 to 20	5
20 to 24	0
Total	351

is shown in Figure 68. The primary burin spalls are much more abundant at the southern end of the excavations in levels 3 and 4.

Secondary Burin Spalls

There are 351 secondary burin spalls from the excavations at El Inga. All are made of obsidian except for a single exception made of flint. These include broken examples as well as complete specimens. The secondary burin spall is represented by a long narrow flake struck from a burin by a secondary burin blow. The removal of a primary burin spall creates the initial burin cutting edge while the removal of the secondary burin spall functions to resharpen the burin by producing a new burin edge. The secondary burin spall tends to be rectangular in cross section, displaying on one face the burin facet from which the primary burin spall was removed, and on the opposite side, the secondary burin facet. Obviously, a continued resharpening of the burin will produce a number of burin spalls, but as these are generally indistinguishable one from the other, all will be considered as secondary burin spalls. An example of the secondary burin spall and its removal from the burin core is shown in Figure 61C.

Most of the specimens from El Inga appear to have been taken from concave scraper-burin cores. This is indicated by the steeply chipped truncation at the striking platform as well as the remaining retouched edges which were not removed by the primary burin spall. Examples of secondary burin spalls from El Inga are illustrated in Figures 70 and 71.

The specimens range from 1.7 to 8.0 cm in length with many of the unbroken spalls falling between 5.0 and 6.0 cm. The thickness of the spalls varies considerably; some are thin, no more than 0.1 cm in thickness, while others are thick and more massive. Occasionally, the burin blow would curve so that a large amount of the burin core was removed as part of the secondary burin spall. Also, many of the burin facets are not flat but curved and produce a twist in the resulting spall. A few specimens have a striking platform area that is partly battered, indicating unsuccessful burin blows and occasional difficulty in removing the burin spall.

Many of the secondary burin spalls would serve as useful tools, and some of them show striations or indications of having been used as a scraper. The evidence of use is present upon the burin facet which could only appear after the spall has been removed from the parent core. An examination of the primary burin edge which is present on the striking platform of the secondary burin spall shows wear and chip removal through usage as a burin. Although the spalls were frequently utilized, their removal was apparently primarily for the purpose of resharpening the burin edge.

The site distribution of secondary burin spalls according to depth is shown in Table 17. They are most abundant in level 3 although five examples appear in level 5. The horizontal distribution according to the various levels is shown in Figure 72. As would be expected, the distribution is similar to that of the primary burin spalls and the concave scraper-burin cores.

Perforators

There are 39 obsidian artifacts classed as perforators, and several examples are illustrated in Figure 73. One specimen, Figure 73A, is bifacially flaked in the manner of the projectile points, but all other examples are made from irregular flakes and have only a small amount of secondary chipping to shape the perforator tip. There are two varieties of perforators, one (29 examples) in which the tip forms a sharp needle like projection and would produce a puncture type hole (Fig. 73C); and the other (10 examples) in which the tip is not pointed but chisel-like and would produce a slot or slit type hole (Fig. 73K). In the latter variety, the unmodified thin flake edge serves as the chisel-like cutting edge.

The specimens are generally small in size, the

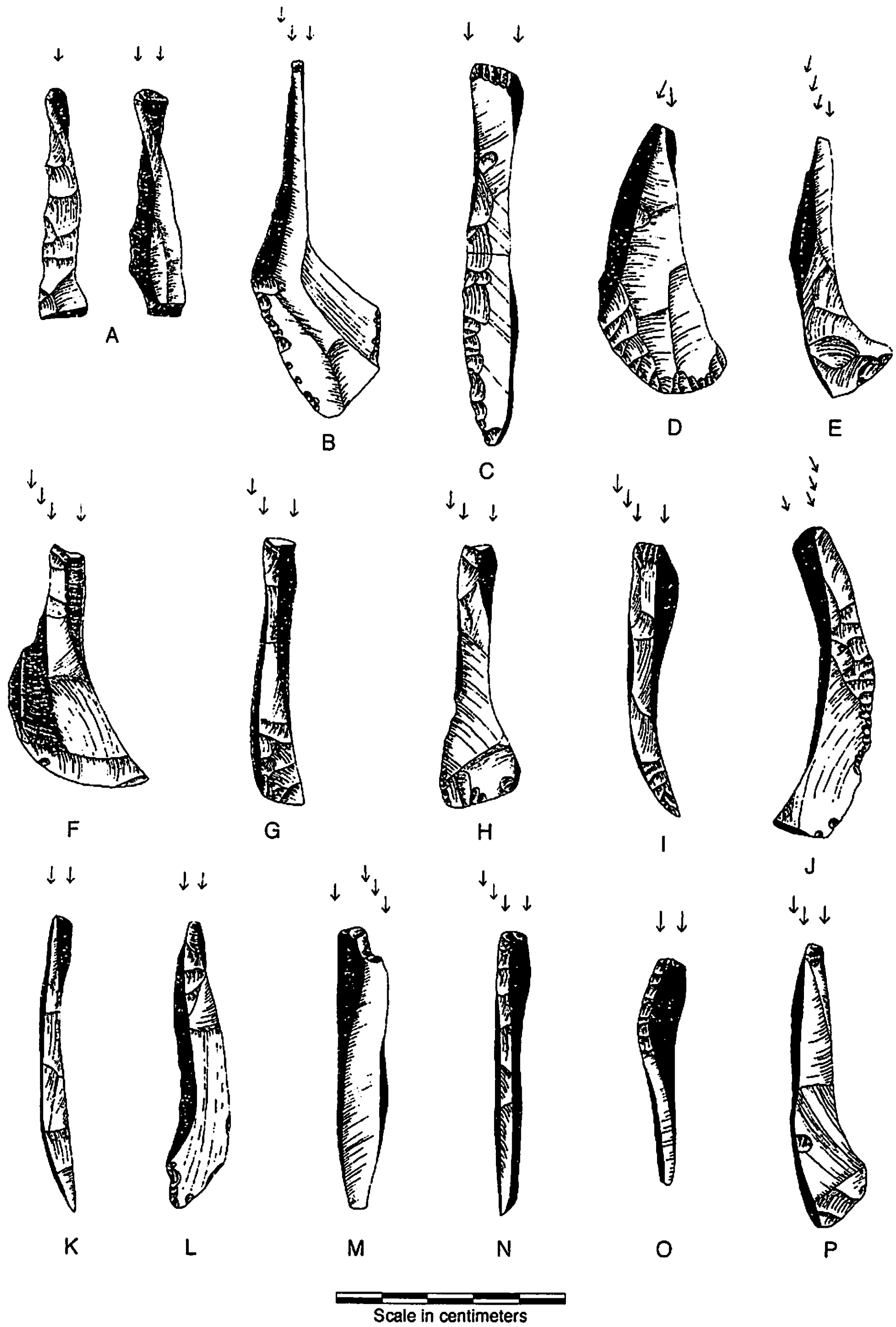


Figure 71. Secondary burin spalls (arrows indicate direction of burin blows): (A) #665, obsidian, two burin spalls, one primary spall and one secondary spall that fit together and were derived from a single burin core, from square S12-L3, depth 4 to 8"; (B) #821, obsidian, from square S6-R1, depth 8 to 12"; (C) #406, obsidian, two pieces of a single burin spall, aboriginal break, from square S11-L3, depth 4 to 8"; (D) #504, obsidian, from square S4-R1, depth 12 to 16"; (E) #641, obsidian, from square S41-L1, depth 12 to 16"; (F) #286, obsidian, from square S36-R1, depth 12 to 16"; (G) #420, obsidian, from square S39-L3, depth 8 to 12"; (H) #44, obsidian, from square S38-L1, depth 12 to 14"; (I) #732, obsidian, from square S41-L3, depth 12 to 16"; (J) #821, obsidian, from square S6-R1, depth 8 to 12"; (K) #611, obsidian, from square S40-L1, depth 12 to 16"; (L) #110, obsidian, from square 0-S38, depth 12 to 14"; (M) #821, obsidian, from square S6-R1, depth 8 to 12"; (N) #216, obsidian, from square S12-L1, depth 8 to 10"; (O) #853, obsidian, from square S38-R1, depth 12 to 16"; (P) #30, obsidian, from square 0-S37, depth 10 to 12".

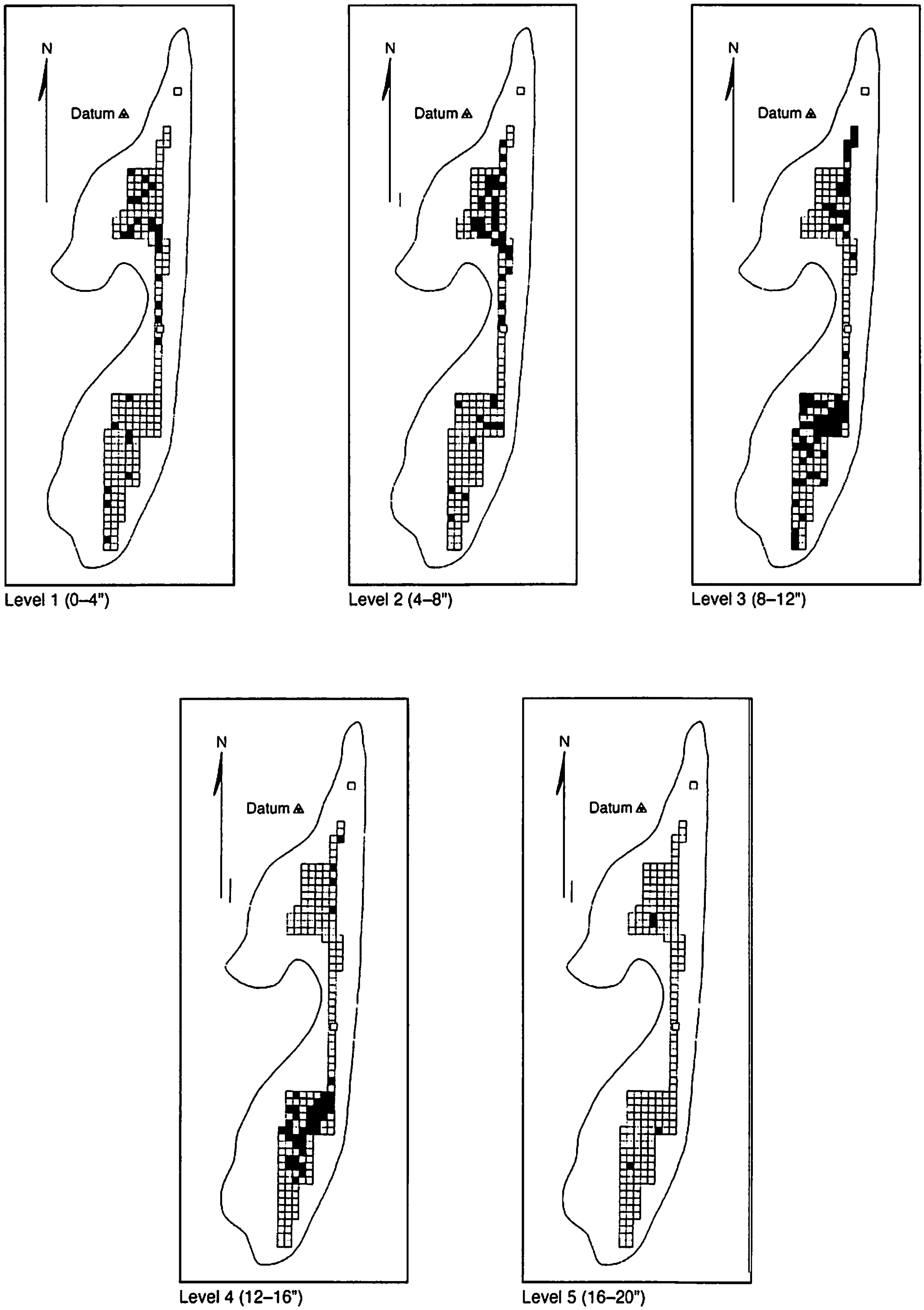


Figure 72. Distribution of secondary burin spalls by level.

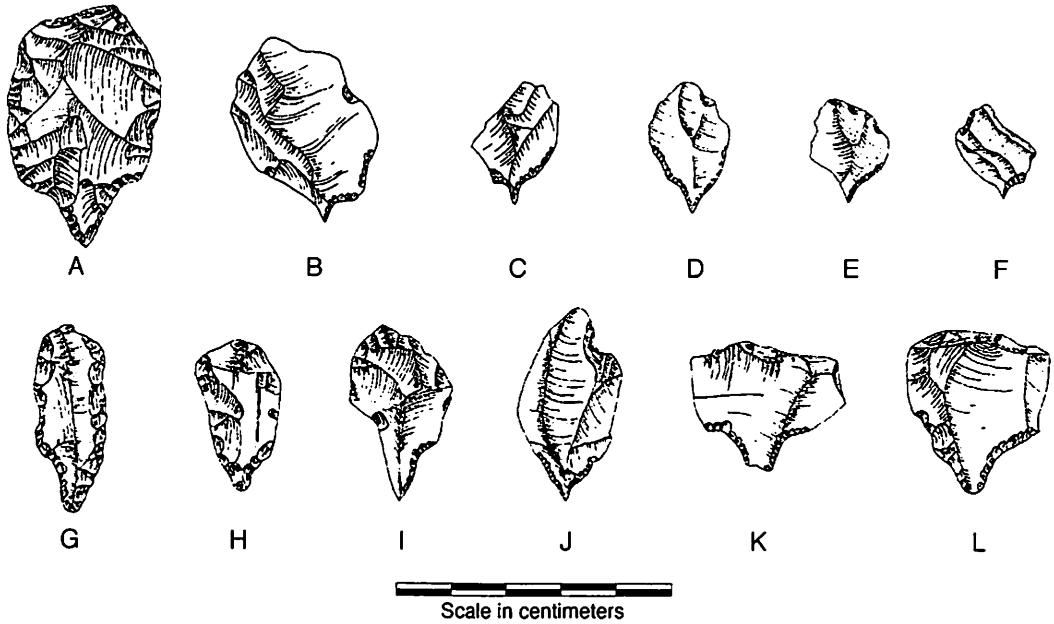


Figure 73. Perforators: (A) #58, obsidian, from square S13-R1, depth 8 to 12"; (B) #721, obsidian, from square S4-L3, depth 0 to 4"; (C) #279, obsidian, from square S23-R1, depth 4 to 8"; (D) #292, obsidian, from square S18-R2, depth 4 to 8"; (E) #826, obsidian, from square S10-L3, depth 4 to 8"; (F) #604, obsidian, from square S40-L1, depth 8 to 12"; (G) #773, obsidian, from square S13-L1, depth 0 to 4"; (H) #499, obsidian, from square S2-R1, depth 8 to 12"; (I) #525, obsidian, from square S52-L5, depth 0 to 4"; (J) #219, obsidian, from square S12-L1, depth 16 to 18"; (K) #773, obsidian, from square S13-L1, depth 0 to 4"; (L) #703, obsidian, from square S46-L3, depth 12 to 16".

maximum length ranging from 1.5 to 4.5 cm. The perforating tip is short, thin, and fragile so that it would be useful only in perforating soft materials or for engraving. Specimens of both varieties occasionally display damage at the tips as if from usage.

The distribution of perforators at El Inga according to the various levels is shown in Table 18. Their distribution in various sections of the site according to the various levels is shown in Figure 74. There appear to be no differences between the two varieties in so far as distribution is concerned.

Miscellaneous Items

After sorting all of the above materials, a small number of items remain which do not conveniently fit into the various categories of artifacts or which require some additional comment. There is a total of 171 specimens represented by these miscellaneous items, and, of these, 151 pieces do not appear to have any special importance. These include trimming flakes from the manufacturing process, pseudo burins, battered or irregular pieces of obsidian, discard or reject material containing flaws, and fragments from artifacts that are badly damaged and cannot be identified. The remaining 20 specimens, however, require some comment.

Table 18. Vertical distribution of perforators.

Depth	Perforators
0 to 4	11
4 to 8	12
8 to 12	12
12 to 16	3
16 to 20	1
20 to 24	0
Total	39

These latter specimens include 5 bifaces, 1 small core, 7 abraded flakes, 2 slot-cutters, 4 basalt scrapers, and 1 basalt chisel. Several of these specimens are illustrated in Figures 76 and 77.

There are five obsidian specimens that are flaked upon both surfaces. Two specimens (Fig. 76A–B) are similar to the plano-convex scrapers discussed earlier except that the flat side has been flaked. One specimen (Fig. 76B) appears to be the broken end from one of the keeled elliptical, plano-convex scrapers. The remaining three bifaces are thick and crudely worked, possibly unfinished knives or scrapers. These are illustrated in Figure 76C–E.

There is one small and poorly worked obsidian

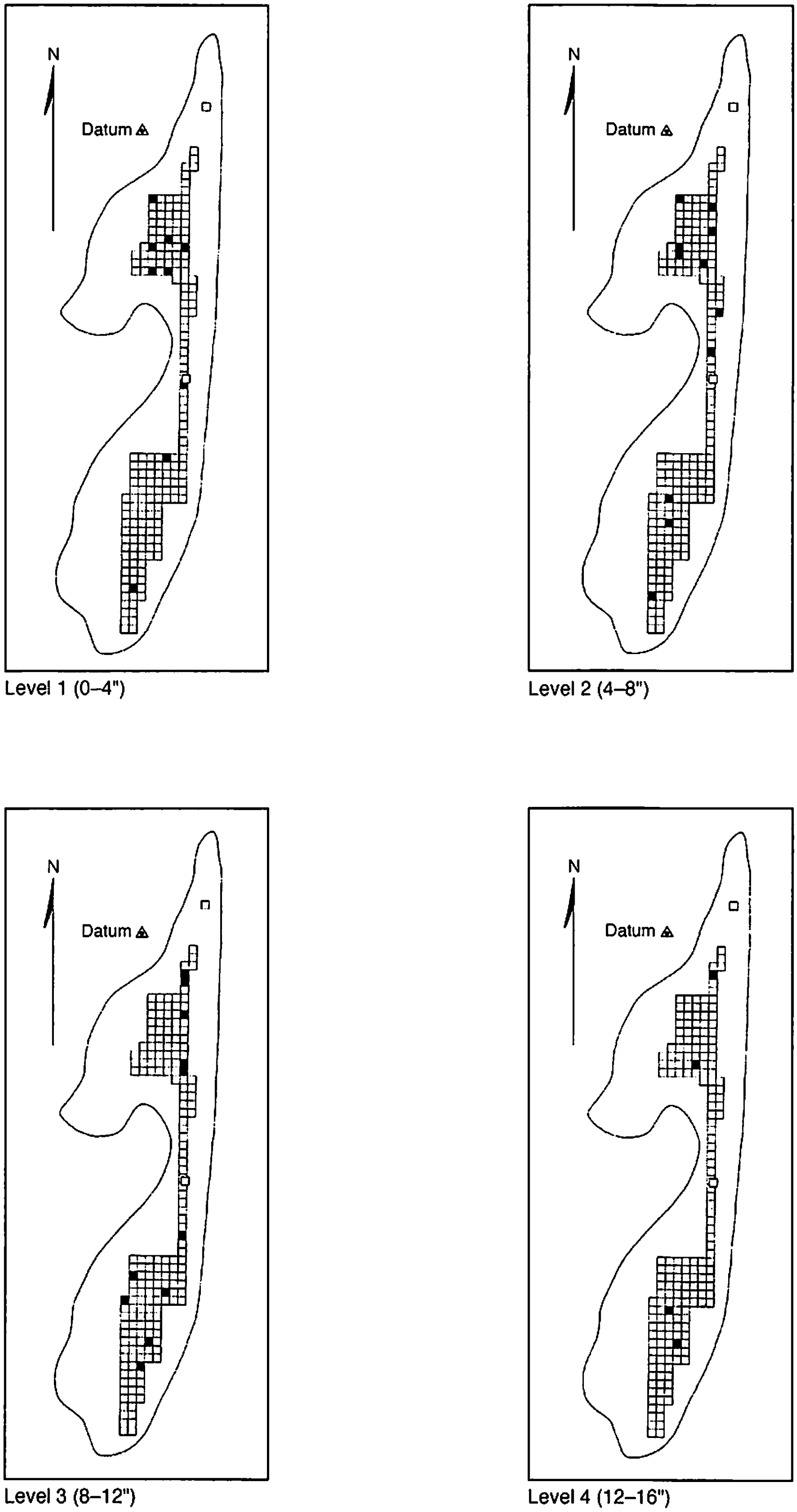


Figure 74. Distribution of perforators by level.

Figure 75. Basalt chisel.

core which has been utilized at each end. Although small and apparently exhausted, it appears to have been used as a source for small blades. The specimen came from square S49-L3, level 3, and is illustrated by four views in Figure 77A.

Seven obsidian flakes show abrasions or striations upon one face or upon a concave edge. Two specimens, apparently sections of flake scrapers, show abrasions upon one surface (Fig. 77B–C). Five specimens are worn and abraded at the edge, possibly from usage in grinding or dulling the sharp edge of a projectile point base. Three examples are illustrated in Figure 77D–F.

Two obsidian flakes have been termed slot-cutters, for they would serve very well for this purpose; both are small flakes with an abraded area on one edge. The flake edge has been used in a back and forth motion similar to that used with a saw or slot-cutter, and the rubbing has abraded the edges of the implement. One specimen (Fig. 77G) has had some of the striations removed by secondary chipping, perhaps to resharpen the dulled edge.

There are four basalt flakes, all under 5.2 cm in length, in which one edge displays wear and polish from use as a scraper. The flakes are unworked otherwise but provided a useful tool without modification.

There is one object designated as a basalt chisel. It is a crescent shaped piece of basalt measuring 4.9 cm in length, 1.6 cm in width and 1.0 cm in thickness. The stone is naturally shaped, apparently by thermal fractures, but each end of the crescent tapers to an edge rather like an incisor tooth (Fig. 75). One end is unworn and somewhat irregular, but the other end tapers to a sharp edge and shows wear on one side from usage as a chisel or graving tool. The specimen came from square O-S11, level 2 (4 to 8").

Stratigraphic Blocks—Artifacts

Although the artifacts found in each of the stratigraphic blocks has been included in the above discussion, it is worthwhile to list the objects found in each of the control blocks separately. An artifact tabulation for the three stratigraphic blocks, as well as a summary of all three, is presented in Tables 19 through 22.

The total number of artifacts from each stratigraphic block is small, and some objects are not represented at all. For example, no ovate or barbed projectile points were found in any of the three blocks.

In general, the distribution of the various artifacts in the stratigraphic blocks resembles that for the entire site. It is also clear that there are differences in the distributions of various artifacts, and some of these will be discussed later. The differences in artifact distributions, in spite of a small sample, suggest that the El Inga assemblage is not a single cultural manifestation, but rather that it is a mixture.

RADIOCARBON DATES

There are five radiocarbon dates that have been obtained for El Inga. Additional samples have been submitted for dating, but the results are not presently available.

The radiocarbon dates available are all based upon an analysis of carbon extracted from soil samples. It was not possible to obtain charcoal in any quantity, and visible flecks of charcoal were rare throughout the excavations. An analysis of soil samples, however, indicated the presence of diffuse carbon in the soil, and consequently numerous samples were collected in the field. These were taken from the various levels in the stratigraphic blocks and in other areas where charcoal was indicated. The following dates are based upon these soil specimens:

Two assays have been run by the Isotopes, Inc., laboratory at 123 Woodlawn Avenue, Westwood, New Jersey (Trautman, 1963):

I-557 4000 ± 190 / 2050 B.C.

El Inga Stratigraphic Block 1, square S37-L1, level 8, depth 14 to 16", collected by R. E. Bell on August 2, 1961.

I-558 5550 ± 200 / 3600 B.C.

El Inga square S13-L2, level 6, depth 20 to 22", collected by R. E. Bell on August 1, 1961.

Three assays have been run through the courtesy of Dr. T. A. Rafter, Director of the Depart-

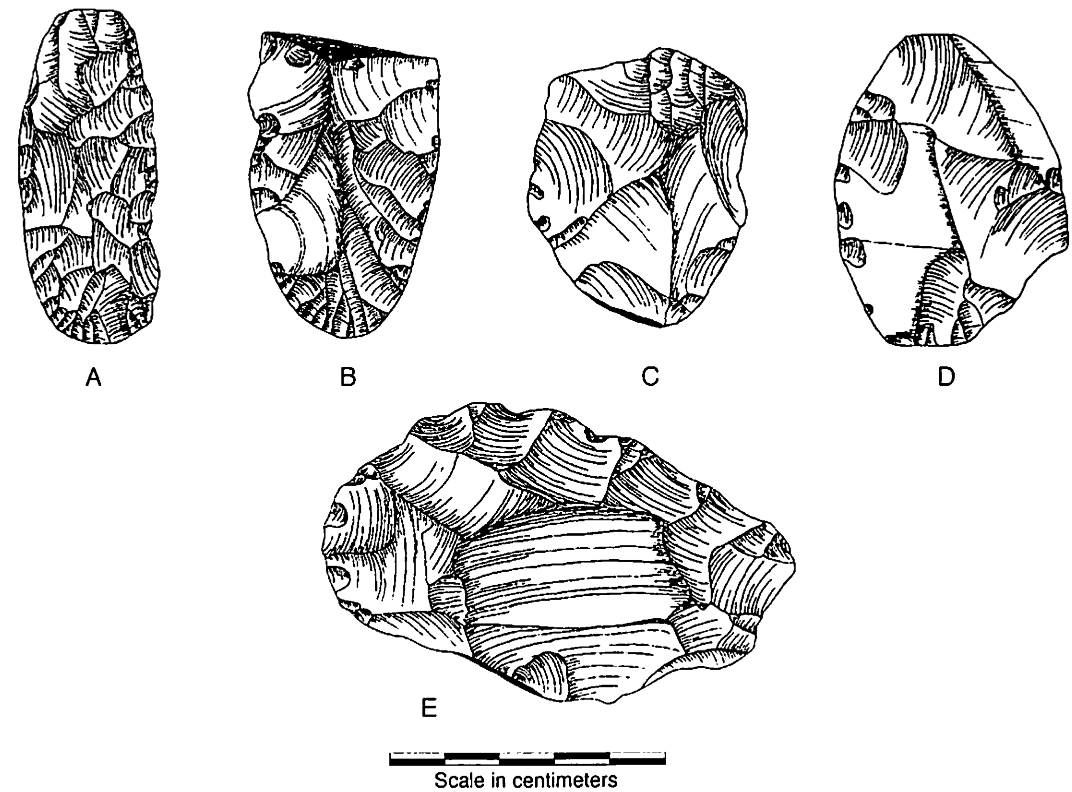


Figure 76. Miscellaneous items: (A) #349, biface, obsidian, from square S13-L2, depth 8 to 12"; (B) #156, biface, obsidian, broken, from square 0-S14, depth 6"; (C) #800, biface, obsidian, from square S8-L1, depth 4 to 8"; (D) #96, biface, obsidian, from square S42-L5, depth 12 to 16"; (E) #80, biface, obsidian, from square S42-L5, depth 12 to 16".

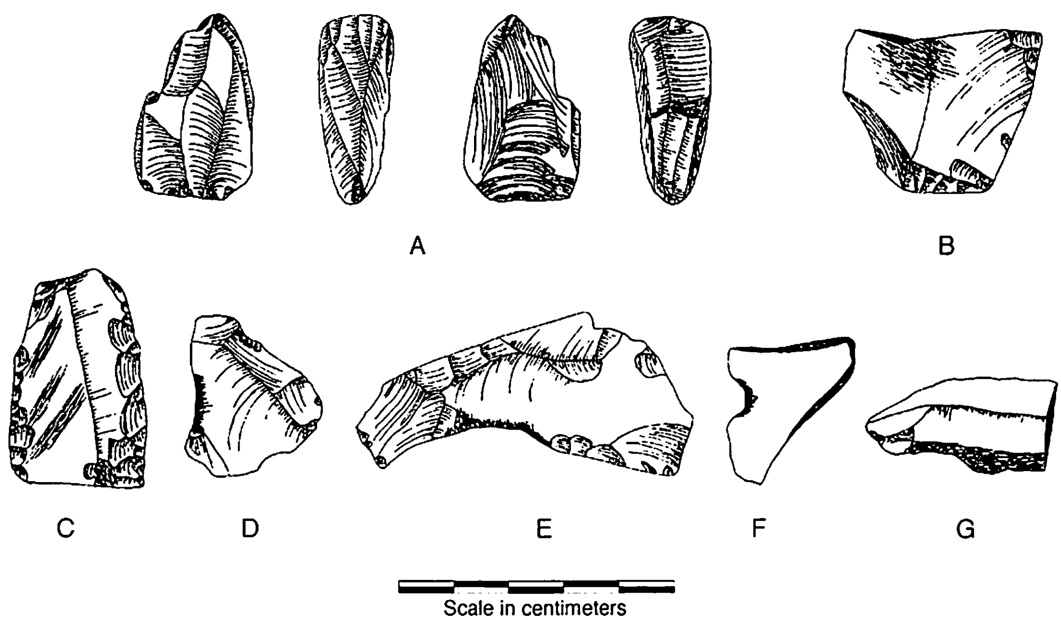


Figure 77. Miscellaneous items: (A) #435, core, obsidian, four views, utilized at both ends, from square S49-L4, depth 8 to 12"; (B) #142, flake with abraded surface, obsidian, from square 0-S6, depth 8 to 10"; (C) #329, abraded flake scraper, obsidian, from square S13-L2, depth 12 to 16"; (D) #667, abraded obsidian flake, from square S19-R1, depth 0 to 4"; (E) #290, abraded obsidian flake, from square S7-L1, depth 12 to 16"; (F) #421, abraded obsidian flake, from square S39-L3, depth 12 to 16"; (G) #608, slot-cutter, obsidian, from square 0-S12, depth 0 to 4".

Table 19. Stratigraphic Block #1.

Depth in inches	Fell's Cave Fish-tail points	Contracting stemmed points	Broad-stemmed points	Ovate points	Barbed points	Unique points	Fragments of points	Hafted stem knives	Bifacial knives	Flake knives	Flake scapers	Concave flake scrapers	Blade-like scrapers	Plano-convex obsidian scrapers	Plano-convex basalt scrapers	Striated scrapers	Concave scraper-burin cores	Burins	Primary burin spalls	Secondary burin spalls	Perforators	Miscellaneous items	Pottery sherds	Total
0 to 2																							14	14
2 to 4											1												9	10
4 to 6																			1				9	10
6 to 8							1				3	1	1						1	2			15	24
8 to 10											1								5				4	10
10 to 12									1	2	7	1		1				1	6	10		4		33
12 to 14									1	6	3						1	1	6	7		2		29
14 to 16	1		1																					0
16 to 18																								0
18 to 20																								0
20 to 22																								0
22 to 24																								0
24 to 26																								0
Total	1	0	1	0	0	0	1	0	2	8	15	2	1	1	0	0	1	2	19	19	0	6	51	130

Table 20. Stratigraphic Block #2.

Depth in inches	Fell's Cave Fish-tail points	Contracting stemmed points	Broad-stemmed points	Ovate points	Barbed points	Unique points	Fragments of points	Hafted stem knives	Bifacial knives	Flake knives	Flake scapers	Concave flake scrapers	Blade-like scrapers	Plano-convex obsidian scrapers	Plano-convex basalt scrapers	Striated scrapers	Concave scraper-burin cores	Burins	Primary burin spalls	Secondary burin spalls	Perforators	Miscellaneous items	Pottery sherds	Total
0 to 2									1		5					1			1	1			42	51
2 to 4											3						1		1	1		1	5	12
4 to 6										5	2					1			1	4		1		14
6 to 8										4	5	1						2	2	4		3		17
8 to 10									1	4	4		1		1		2			2		2		9
10 to 12		1								2	4			1								1		2
12 to 14											2													1
14 to 16							1																	0
16 to 18																								0
18 to 20																								0
20 to 22																								0
22 to 24																								0
24 to 26																								0
Total	0	1	0	0	0	0	1	0	2	15	25	1	1	1	1	2	3	2	5	12	0	8	47	127

Table 21. Stratigraphic Block #3.

Depth in inches	Fell's Cave Fish-tail points	Contracting stemmed points	Broad-stemmed points	Ovate points	Barbed points	Unique points	Fragments of points	Hafted stem knives	Bifacial knives	Flake knives	Flake scapers	Concave flake scrapers	Blade-like scrapers	Plano-convex obsidian scrapers	Plano-convex basalt scrapers	Striated scrapers	Concave scraper-burin cores	Burins	Primary burin spalls	Secondary burin spalls	Perforators	Miscellaneous items	Pottery sherds	Total
0 to 2									1		7				1			2	2	2		2	20	37
2 to 4									2		2								1		1		5	11
4 to 6									1		2	1		2		1	3		1	1				12
6 to 8							1			1	2			1				1		1				7
8 to 10									2		3						1	1		2		1		10
10 to 12						1				2	3						1	1						8
12 to 14									2													1		3
14 to 16	1					1	1		3	2	3		2	4				1	1					19
16 to 18	1						1		6		8		1	3						1	1			22
18 to 20							2		1		2			1	1			1	1	2				11
20 to 22	1						2		1	1	4			4										13
22 to 24	1						1				4							1	1					8
24 to 26													1											1
Total	4	0	0	0	0	2	8	0	19	6	40	1	4	15	2	1	5	8	7	9	2	4	25	162

Table 22. Stratigraphic Blocks #1, #2, and #3 combined.

Depth in inches	Fell's Cave Fish-tail points	Contracting stemmed points	Broad-stemmed points	Ovate points	Barbed points	Unique points	Fragments of points	Hafted stem knives	Bifacial knives	Flake knives	Flake scapers	Concave flake scrapers	Blade-like scrapers	Plano-convex obsidian scrapers	Plano-convex basalt scrapers	Striated scrapers	Concave scraper-burin cores	Burins	Primary burin spalls	Secondary burin spalls	Perforators	Miscellaneous items	Pottery sherds	Total
0 to 2									2		12				1	1		2	3	3		2	76	102
2 to 4									2		6						1		2	1	1	1	19	33
4 to 6									1	5	4	1		2		2	3		3	5		1	9	36
6 to 8							2			5	10	2	1	1				3	3	7		3	15	52
8 to 10									3	4	8		1		1		3	1	5	4		3	4	37
10 to 12		1				1			1	6	14	1		2			1	2	6	10		5		50
12 to 14	1		1						3	6	5						1	1	6	7		3		34
14 to 16	1					1	2		3	2	3		2	4				1	1					20
16 to 18	1						1		6		8		1	3						1	1			22
18 to 20							2		1		2			1	1			1	1	2				11
20 to 22	1						2		1	1	4			4										13
22 to 24	1						1				4							1	1					8
24 to 26																								1
Total	5	1	1	0	0	2	10	0	23	29	80	4	6	17	3	3	9	12	31	40	2	18	123	419

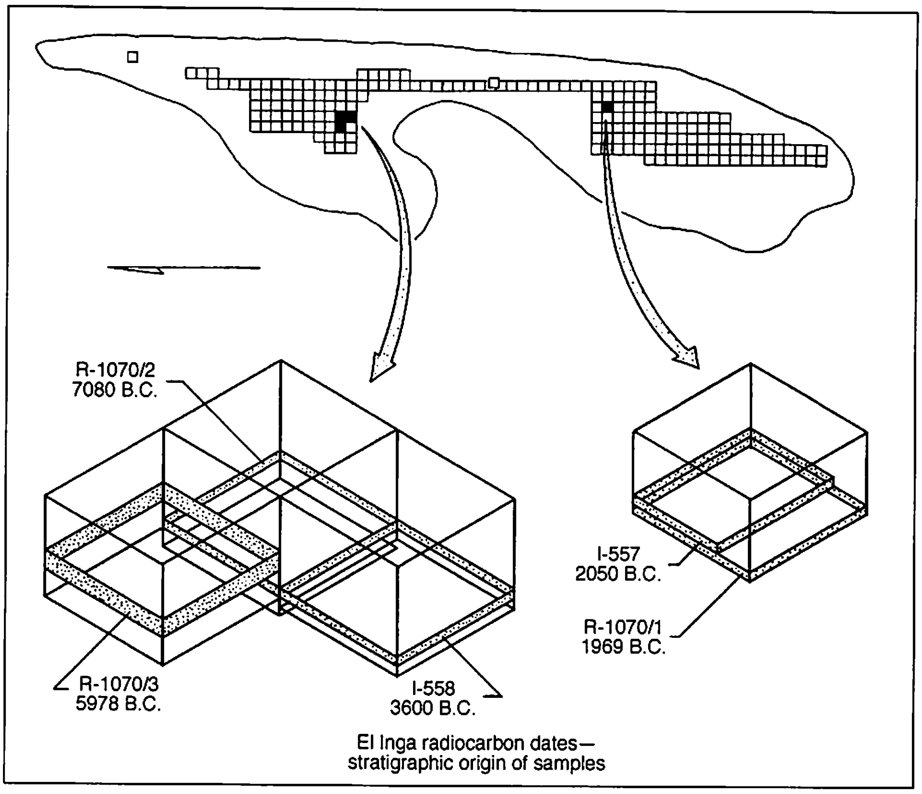


Figure 78. Provenience of radiocarbon dated soil humates at El Inga site.

ment of Scientific and Industrial Research Institute of Nuclear Sciences, Lower Hutt, New Zealand:

R-1070/1 3919 ± 121 / 1969 B.C.
El Inga Stratigraphic Block 1, square S37-L1, level 9, depth 16 to 18", collected by R. E. Bell on August 4, 1961.

R-1070/2 9030 ± 144 / 7080 B.C.
El Inga Stratigraphic Block 3, square S12-L2, level 11, depth 20 to 22", collected by R. E. Bell on August 19, 1961.

R-1070/3 7928 ± 132 / 5978 B.C.
El Inga square S12-L3, level 4, depth 12 to 16", collected by R. E. Bell on August 3, 1961.

The stratigraphic relationships of these dates is shown in Figure 78. Some observations with reference to these dates should be mentioned. Two specimens, R-1070/2 and I-558, are from the same levels in adjacent squares but vary considerably in their respective dates. Since specimen R-1070/3 is stratigraphically consistent with R-1070/2, it would appear that I-558 is in error.

The two specimens, I-557 and R-1070/1, from the southern section of the site are satisfactory dates for the stratigraphy in one square, but they are inconsistent with the dates from the northern section of the site. The acceptance of these two dates suggests that the southern section of the site dates some 4000 years later than the northern section, a distinction which is not strongly supported by distributional differences in artifacts. There are, however, some differences that have been noted earlier.

DISCUSSION AND CONCLUSIONS

The artifacts found at El Inga constitute an assemblage of materials that has not been reported elsewhere in either South America or North America. Some of the artifacts, such as the projectile points, occur elsewhere and serve as convenient cultural and chronological guides. Other artifacts, however, such as the striated scrapers, concave scraper burin cores, and burin spalls are presently unreported. The real significance of these items will emerge only after more work has been done, not only in Ecuador but in the rest of the New World.

The total El Inga assemblage has the flavor of an early lithic industry in which hunting served as the basic economy. The presence of fluted points, basal thinning, stem edge grinding, large plano-convex scrapers, bifacial knives, perforators, burins, and the absence of stone grinding, all suggest an antiquity comparable with the Paleo-Indian horizons of North America. The El Inga radiocarbon dates tend, in part, to support this view, although comparisons with other dated materials from South America suggest that the El Inga dates are too young. The time range of 5000 years that is further indicated by the available dates appears excessive although some time differences are suggested by the typology of the artifacts and their distributions within the site. It is deemed worthwhile to consider some of the individual artifacts with comparative materials from other sections of South America. For this purpose, the excellent survey of "Early Lithic Industries of Western South America" by Lanning and Hammel (1961) is essential.

The Fell's Cave Fish-tail projectile point is the most important type found at El Inga. It is represented by the greatest number of specimens and occurs by itself in the deepest parts of the site. These points are similar to those recovered by Junius Bird (Lanning and Hammel, 1961; Bird, 1938, 1946) in the deepest levels of Fell's Cave in Patagonia. At Fell's Cave the points are associated with extinct fauna, the horse and sloth, as well as some unidentified ground stone objects. There are two radiocarbon dates for the lower levels of Fell's Cave: W-915 at 8759 B.C. and C-485 at 6688 B.C. The two dates are contradictory, but Lanning and Hammel (1961:150) tend to discount the latter one. The older date of 8759 B.C. from Fell's Cave is considerably older than the oldest date of 7080 B.C. from El Inga. In view of other considerations, it would appear that one or possibly both dates are in error.

The Fell's Cave Fish-tail points found at El Inga are sometimes fluted while those found at Fell's Cave in Patagonia are not fluted. The presence of the fluting and its parallels with fluted points in North America suggest that the Ecuadorian specimens should predate the unfluted examples from the southern part of South America. Other discoveries of this type are very limited although Cruxent (1959, in Lanning and Hammel, 1961:151) report one specimen from Brazil. As to whether this Brazilian specimen is fluted or not, remains unsettled.

Looking northward, Sander (1959) reports two specimens of fluted stemmed points from surface collections at Madden Lake in Panama. Sander (1959:48) illustrates both specimens in figure 9a-b. Through the courtesy of Russel D. Mitchell of Balboa Heights, Canal Zone, plaster-of-paris copies of these two points were obtained for comparison with the El Inga specimens. Both specimens would fit into the El Inga Fishtail group although the smaller broken base is the more typical example. There are no dates available for these specimens from Panama, nor is it clear as to whether or not the stem edges have been ground.

More recently, Bullen and Plowden (1963) have reported the finding of fluted stemmed points resembling the Fell's Cave Fish-tail type in Honduras. Two specimens are illustrated in figure 2a (Bullen and Plowden, 1963:384). It is of interest to note that the Honduras locality has also produced tapering stemmed points, scrapers, prismatic knives, and utilized flakes of obsidian which also resemble artifacts from El Inga.

According to Bullen and Plowden (1963:385) fluted stemmed points are also known from Costa Rica. Earlier reports indicate the presence of fluted points in Costa Rica (Swauger and Mayer-Oakes, 1952), Guatemala (Coe, 1960) and Mexico (Aveleyra Arroyo de Anda, 1962).

Thus, it would appear that fluted points can be traced from the western plains of the United States southward through Mexico, Guatemala, Honduras, Costa Rica and Panama into South America where they first appear at El Inga. Examples should occur in Colombia, to the north of Ecuador, but conversations with Gerardo Reichel-Dolmatoff of Bogota, Colombia, indicate that specimens are currently unknown in that region.

Another characteristic projectile point from the El Inga complex is the broad-stemmed point of which Figure 27A and E would be good examples. This type is large in size, exhibits basal grinding, and may be merely a large variety of the Fell's Cave Fish-tail type. The lack of fluting and the generally larger size, however, may be significant. The specimens from El Inga do not extend to as great a depth as the smaller fish-tail forms although it is believed that the two types are closely related. This broad-stemmed type is apparently a specialization in Ecuador, and Carluci de Santiana (1963) has presented data concerning its known distribution.

There are five ovate or leaf-shaped projectile points from the excavations although no examples were found in the stratigraphic blocks. They appear later than the Fell's Cave Fish-tail type and at the same time as the broad-stemmed forms. Since ovate forms are widespread in South America, it is somewhat surprising that they are so poorly represented at El Inga. The El Inga specimens are quite unlike the El Jobo examples from Venezuela to the north (Cruxent and Rouse, 1958, 1959) and have a closer resemblance to the willow leaf Ayampitin types to the south (Lanning and Hammel, 1961). These are considered to be the hallmark of Lanning and Hammel's Period III which is believed to date between 6000 and 3000 B.C. The El Inga specimens, however, have considerable range in size, and the basal sections are commonly more triangular than rounded in outline.

Finally there are some contracting stemmed forms and barbed types represented at the site. These appear to be the latest types and follow the leaf shaped or ovate forms, which appears to be the case in other parts of South America. It is quite possible that, since their bases are broken, the three specimens, discussed under barbed points, actually belong with the stemmed types.

Thus, in so far as projectile points are concerned, the earliest type is the Fell's Cave Fish-tail which is in turn followed by the broad-stemmed points and the ovate forms; finally, the stemmed types appear. This seems to be the general chronological sequence in other parts of South America, and it is repeated throughout most chronologies in North America.

The knives found at El Inga are not very helpful in so far as chronology is concerned. The single hafted stemmed knife can be assigned along with the Fell's Cave Fish-tail projectile points on the basis of typology; the other bifacial knives and flake knives appear in all levels.

The scrapers, on the other hand, present certain differences in their distributions. The flake scrapers, blade-like scrapers and plano-convex scrapers occur in all levels. The concave scrapers and the striated scrapers occur only in the upper four levels. There is also the hint that the basalt plano-convex scrapers may be slightly later than those made of obsidian. An examination of the plano-convex scrapers, when arranged according to the various depths, suggests that the larger specimens are more common in the lower levels and that the scrapers become smaller through time.

The small perforators do not occur in the deepest parts of the site, and their greatest number appears in the upper levels.

The burins, concave scraper-burin cores, and burin spalls also differ somewhat in their distribution. The simple burin is represented in the deepest levels by a single example, but it is considerably more abundant in the later levels. The concave scraper-burin cores do not occur at depths over 16" but appear in quantity at level 4 along with numbers of burin spalls.

These chronological suggestions should be considered as tentative or as a working hypothesis. The cultural deposit at El Inga is not very thick, and the total numbers of specimens are quite small. A glance at the tables showing the distribution of artifacts from the stratigraphic blocks and the entire site will show weaknesses in the stratigraphic evidence. Nonetheless, the variety of projectile points, the variations in artifact distribution not only in depth but horizontally within the site, and the range in radiocarbon dates now available provide some evidence, admittedly weak, to propose three complexes for the site. These would include the following artifacts (significant items for each period are underlined):

El Inga I:
- <u>Fell's Cave Fish-tail points</u>
- Bifacial flaked knives
- Flake scrapers
- Blade-like scrapers
- <u>Large plano-convex obsidian scrapers</u>
- Simple angle burins

El Inga II:
- <u>Ovate or leaf shaped points</u>
- <u>Broad-stemmed points</u>
- Bifacial flaked knives
- Flake knives
- Flake scrapers
- Blade-like scrapers
- Obsidian plano-convex scrapers
- Basalt plano-convex scrapers
- Simple angle burins

El Inga III:
- <u>Contracting stemmed points</u>
- Bifacial flaked knives
- Flake knives
- Flake scrapers
- <u>Concave flake scrapers</u>
- Blade-like scrapers
- Obsidian plano-convex scrapers
- Basalt plano-convex scrapers
- <u>Striated scrapers</u>
- <u>Concave scraper-burin cores</u>
- Simple burins
- Burin spalls primary and secondary
- <u>Perforators</u>
- Basalt scrapers flake
- Striated stone
- Abraded flakes slot-cutters

This suggested sequence will provide a working hypothesis that can be tested by work at other sites in the immediate vicinity of El Inga. There are a number of other sites in this region, and surface collections already indicate differences in their context. The sites are characterized by a varied chipped stone assemblage and should be helpful in testing the above hypothesis or in providing additional information about the early cultures of highland Ecuador. This will require excavations of a similar nature to that done at El Inga in other sites which have been carefully selected to solve specific chronological problems.

One problem concerning El Inga which still remains unsettled rests in the fact that a number of artifacts which were collected from the surface did not appear in the excavations. For example, there are a number of crude basalt implements such as thick scrapers and scraper planes (pulping planes) from the surface, but none were found in the excavations. Consequently, the relationship of these items to the El Inga assemblage remains unknown at this time. Moreover, these items are abundant on certain other sites and must form an integral part of the archaeological complexes in the region.

The actual dates for the El Inga complex remain uncertain in spite of the available radiocarbon assays. The early date from Fell's Cave suggests that the El Inga dates should be earlier than 7080 B.C. in view of projectile point typology. Also, the youngest date of around 2000 B.C. appears too late in view of the simple chipped stone assemblage, the absence of ground stone implements, and the fact that, by this date, there were highly advanced cultures existing elsewhere in Ecuador (Estrada and Evans, 1963).

SUMMARY

The site of El Inga is located in the Andean highlands about 12 miles east of Quito, Ecuador. The discovery of fluted projectile points focused attention upon this site, and during the summer of 1961 a period of approximately two months was spent in excavations. These were concentrated within the largest remaining section of the site that had not been destroyed by erosion. A total of approximately 200 5' squares was excavated by arbitrary levels, each four inches in thickness. For more careful control, three stratigraphic blocks (each 10' square) were excavated by 2" levels.

The site is composed of an unstratified occupational soil mantle averaging between 16 and 18" in thickness and resting upon a sterile volcanic deposit known locally as cangahua. The top surface of the occupational deposit has been plowed throughout the years, and pottery sherds of modern as well as prehistoric manufacture appeared in this disturbed layer. The occupational debris appears concentrated within the lower section of the occupational mantle although artifacts are to be found throughout the entire deposit. Excavation revealed an absence of occupational floors or distinct surfaces, fireplaces or hearths, animal bones, or other occupational features other than chipped stone debris. The presence of numerous artifacts and abundant chipped stone debris such as chips and flakes of obsidian and basalt, however, indicate that the locality had been used as a habitation area for some period of time.

Artifacts recovered from the excavations include pottery sherds which are believed to be intrusive and a number of chipped stone items made chiefly from either obsidian or basalt. These artifacts include several varieties of projectile points including, the fluted Fell's Cave Fishtail type, a broad-stemmed form, a contracting stemmed form, an ovate or leaf shaped form, and some unique specimens. Knives are represented by a single stemmed specimen, bifacially chipped ovate forms, and simple flake. Scrapers are also abundant and are represented by several varieties: simple flake scrapers, concave or hollowed scrapers, blade-like scrapers, plano-convex scrapers, and a specialized type designated as the striated scraper. Burins are represented by simple angle burins, dihedral angle burins, and concave scraper-burin cores along with an abundance of burin spalls, both primary and secondary. Other objects include perforators, basalt flake scrapers, striated flakes, an object termed a "slot-cutter," small pieces of hematite, and a single striated or grooved stone.

Detailed studies of all materials from the excavations according to their distributions within the site and a comparison with other known assemblages in western South America are used to propose a sequence of occupations which are designated as El Inga I, II and III. This suggested sequence is based upon weak but suggestive evidence, and the characteristics of each period are listed for future verification or correction.

The available radiocarbon dates suggest an occupation ranging from roughly 7000 B.C. to 2000 B.C., a period of about 5000 years. In view of other considerations it is felt that these dates are too young and that a greater antiquity should be indicated.

The earliest materials (El Inga I) are believed to be related to the early Paleo-Indian horizons to the north in western North America and to represent an early movement of peoples utilizing a fluted point tradition into South America. The later materials (El Inga II and III) tend to show relationships toward the south, but the presence of certain distinctive artifacts (burin technology) and our ignorance of these items in South America make comparisons very speculative.

ACKNOWLEDGMENTS

Any piece of research that is done will include contributions by a number of persons. These contributions will cover a range of items, extending from initial financial support to the final typing of a completed manuscript. While some contributions are perhaps more important than others, each one is significant in that it makes possible the final goal-completion of a specific piece of research. In preparing this manuscript on fieldwork at El Inga, I find that many persons and institutions have contributed to this final product, and I wish to express my gratitude and appreciation to those contributors.

First of all, I would like to acknowledge Mr. A. Allen Graffham of Ardmore, Oklahoma, because he first brought the site of El Inga to my attention. Mr. Graffham recognized the importance of the site and loaned his collection of material for study and evaluation. I trust he will be pleased with the developments that he thus initiated; he certainly can be proud of the role that he has played in South American archaeology.

Funds for the initial pilot project of 1960 were furnished jointly by the Oklahoma Frontiers of Science Foundation, the Alumni Foundation and the Faculty Research Committee of the University of Oklahoma. Especially, I would like to express thanks to Dr. James Harlow and Dr. Duane Roller, as officials of the above groups, for their support and encouragement.

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One special pleasure associated with this research has been the friendship established with a number of persons in Ecuador. Everyone with whom I worked offered his help, understanding and cooperation in achieving the objective I had in mind. As a guest in their country, I am very grateful for this sympathetic reception. Especially, I wish to thank the various officials of the Casa de la Cultura in Quito for making our excavations possible in granting the necessary permits, for consultations with land owners, for arrangements to pass field equipment through customs, and for numerous other matters in which they offered a ready solution. I wish to express my thanks to Mr. Julio Endarra Mr. Benjamin Carrion, Mr. Carlos Manuel Larrea and Mrs. Matilda de Ortega, all members of the Casa de la Cultura, for their gracious help and assistance.

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Many other persons contributed to successful fieldwork. Mr. Pedro Leopoldo Nunez, the landowner, granted permission for the excavations and visited the site to explain our mission to the local tenants. Mr. Jerry James and Mr. Max Grossman of the American Embassy staff helped me to become acquainted with numerous individuals in Quito and maintained an active interest in the archaeological activities. Important supplies were obtained through the help of Mr. George E. Richardson of the Inter-American Geodetic Survey and Mr. Harold G. Conger of the Servicio Cooperative Inter-americano de Salud Publica.

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On the local Oklahoma scene, I wish to express thanks to the Department of Anthropology, the Stovall Museum, and the Research Institute of the University of Oklahoma for providing time, space, or various facilities which have been necessary in carrying out this project. I would also like to thank certain members of the School of Geology: Dr. Charles Mankin and John Schleicher for furnishing data on soil analysis; Dr. David Kitts for his study of the limited paleontological material, and Dr. Reginald Harris for providing the solution to a difficult photographic problem.

In the laboratory there are always routine tasks of one sort or another to be done, and I have had help from a number of persons. I want to thank each of the following individuals for their services: Mr. Don G. Wyckoff, Miss Elizabeth Pillaert, and Miss Sigrid Schmitt for the laborious task of washing, sorting, and cataloguing specimens; Daniel McPike, Hank Kerr, Gerald Dickson and Handley P. Shull for help in drafting, distributional studies, and chart preparation; Derwood Lane and Nancy Halliday for the art work in four figures of artifacts, and Richard McWilliams and Henry Klippell for photographic services in the dark room.

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A few archaeologists have examined parts of the El Inga materials and have made some contributions in some manner, either directly or indirectly, through influencing my thinking about some matter, and I wish to thank Dr. Marie Wormington of the Denver Museum of Natural History and Dr. Joe Ben Wheat of the University of Colorado for their initial interest in El Inga. Dr. Jeremiah F. Epstein of the University of Texas has been very helpful in problems of technology and classification, especially with burins, burin spalls, and the like. Dr. James L. Giddings of Brown University examined a small sample of the materials and pointed out similarities and differences with the Cape Denbigh complex in the Arctic. Dr. Junius Bird of the American Museum of Natural History also examined some materials and discussed parallels with finds he had made at Fell's Cave in Patagonia. Mr. Masakaza Yoshizaki of the Hakodate Municipal Museum, Hokadate, Hokkaido, Japan, passed through Norman where he examined the El Inga materials and provided comparative information upon obsidian complexes of northern Japan. Mr. Dan Sander and Dr. Russell D. Mitchell of Balboa Heights, Canal Zone, have furnished pictures and casts of fluted point specimens found in Panama, and Ripley P. Bullen and William W. Plowden have supplied photographs of fluted examples from Honduras.

Finally, I wish to express my thanks and appreciation to Virginia, my wife, for help in many ways, especially for editing and correcting my errors in English.

I also wish to acknowledge my former partner, Dr. William Mayer-Oakes, no longer associated with the University of Oklahoma but now located at the University of Manitoba at Winnipeg, Canada. As a partner and Director of the Stovall Museum, he handled the administrative details while I worked in the field. At present he is preparing a supplementary report upon the 1960 surface collections from the site.

The photographs and drawings, with the exception of those mentioned above, were made by the author. The illustrations were drawn actual size, and the scale is expressed in centimeters.

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ARCHAEOLOGICAL INVESTIGATION AT THE SITE OF EL INGA, ECUADOR

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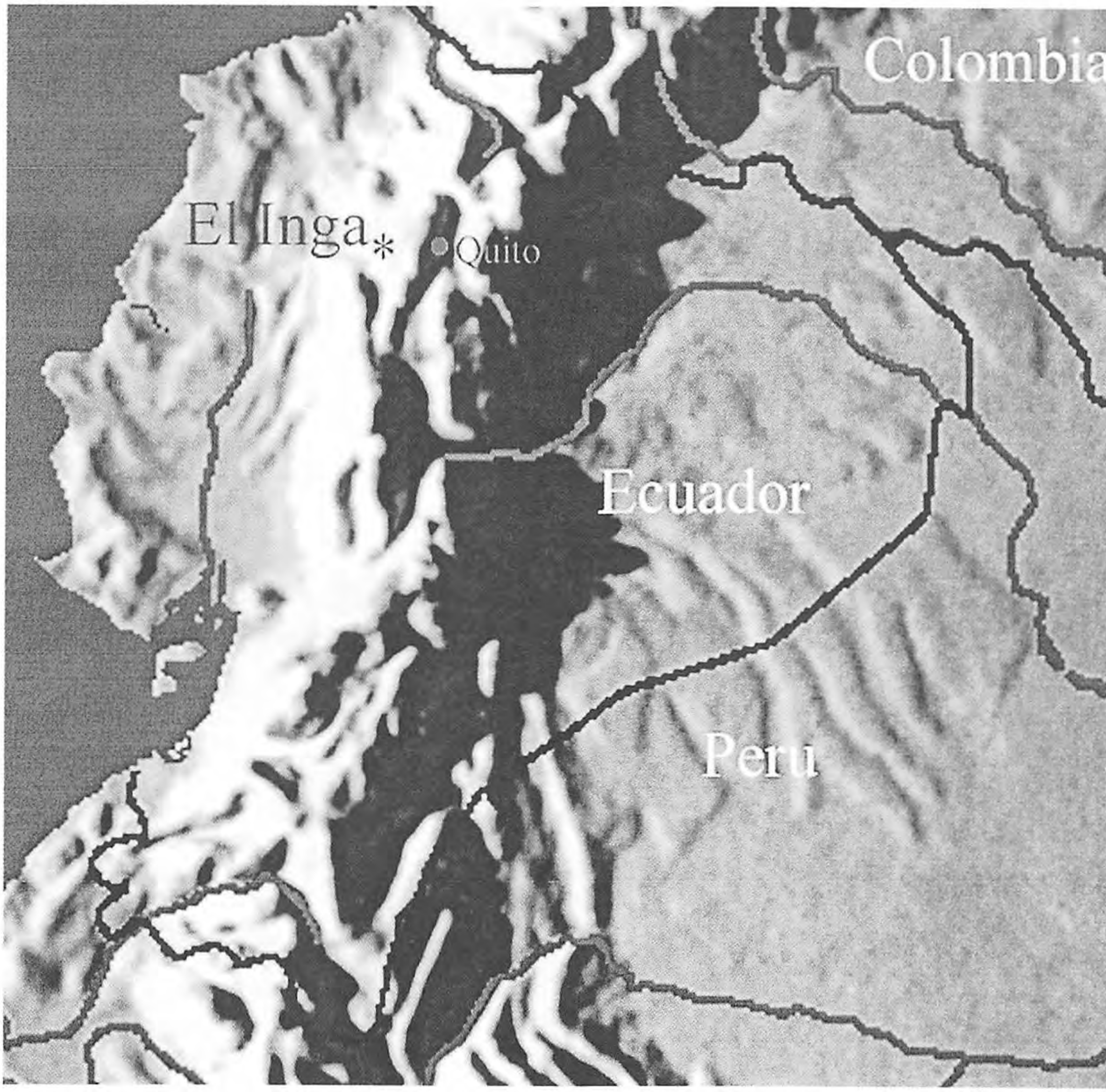

Location of El Inga archaeological site in Ecuador

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PREFACE

Dr. Robert E. Bell's report on the El Inga Site in Ecuador inaugurates a series of anthropology monographs sponsored by the Sam Noble Oklahoma Museum of Natural History. Funded by anonymous benefactors, the R. E. Bell Monographs in Anthropology will be an outlet for students and staff at the Museum studying archaeology and ethnology. These monographs will be published as manuscripts become available from research conducted at the Museum or on collections for which the Museum serves as a steward for care and preservation.

We are especially pleased to make the El Inga report the first issue in the *R. E. Bell Monographs in Anthropology*. This study of a Paleoindian site in highlands of Ecuador was never published in North America. Originally submitted in 1964 as a final report to the National Science Foundation, this study was published in 1965 in Spanish and English by the Casa de la Cultura Ecuatoriana of Quito, Ecuador. Unfortunately, few copies of this publication ever reached North America. Although we have reformatted it somewhat, this latest edition is the text that was submitted to the National Science Foundation in 1964. Dr. Bell has kindly reviewed and edited this version, and he provided the slides from which the several pages of plates were produced. We thank him for his support and interest. We also thank Joan Harrel for scanning the original text so that we could format it and integrate the illustrations at appropriate places. In addition, we express our appreciation to Dr. Gary D. Schnell, Curator of Birds and Associate Director for Collections and Research at the Sam Noble Oklahoma Museum of Natural History, and to David L. Certain, Graduate Research Assistant, for access to equipment used in producing this edition.

Naming this monograph series after Dr. Bell is merited. From 1947 to 1980, he taught anthropology at the University of Oklahoma and served as curator of anthropology/archaeology at the University's Stovall Museum. Trained in dendrochronology, Dr. Bell maintained a strong interest in thorough analyses of all materials recovered during archaeological excavations. During his tenure at the University of Oklahoma, he inspired dozens of students to seek answers in pottery, chipped stone tools, chipped stone debris, animal bones, and the dirt and habitation features exposed at all kinds of prehistoric sites. These students had ample opportunities to analyze collections for research papers and theses because of Dr. Bell's knowledge of the vast archaeological collections for which he was responsible at the Stovall Museum. There, in the long rectangular room with extensive layout space on tables and counter tops, students spent countless hours comparing, measuring, photographing, and documenting their findings. Dr. Bell was usually there on Tuesdays, Thursdays, and Saturday mornings, and he was always willing to listen, question, and advise those working on research projects. As former student Jack Hofman has remarked, Dr. Bell's pipe smoke served as a catalyst for serious work.

Through the years, Dr. Bell was recognized for his contributions to understanding and preserving the prehistory of Caddoan speaking people, those who once inhabited eastern Oklahoma, as well as Plains villagers who lived in central and western Oklahoma, including the Panhandle. Less well known is Dr. Bell's pivotal role in studying ancient hunters and gatherers in the highlands of South America. He worked mainly in the mountains of Ecuador, where he conducted surveys and excavations to find materials left by groups frequenting those settings soon after the last ice age. Some of this effort was stimulated by his 1961 excavations at the El Inga site.

Don G. Wyckoff

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INTRODUCTION

The archaeological site herein designated by the name of El Inga was brought to the attention of Robert E. Bell by Mr. A. Allen Graffham of Ardmore, Oklahoma. While employed as a geologist in Ecuador, Mr. Graffham followed his archaeological interest as an amateur, and he made surface collections at the site during the early months of 1956. The discovery of projectile points, particularly specimens exhibiting basal fluting, stimulated his interest, and several visits were made to the site for collecting surface materials. Graffham's previous interest in Paleo-Indian remains and his experience with early man materials found in Kansas and Nebraska in the Central Plains led him to believe that the site was an important discovery. Consequently, upon his return to the United States, he brought his collection to Robert E. Bell at the University of Oklahoma for inspection. Bell also recognized the importance of the site collections and presented a paper reporting the finds at the annual meeting of the Society for American Archaeology at Salt Lake City, Utah on May 1, 1959. Several persons in attendance expressed enthusiastic interest, and Dr. Marie Wormington of the Denver Museum of Natural History and Dr. Joe Ben Wheat of the University of Colorado urged that further investigation be initiated as soon as possible. To make the data generally available, Bell (1960) prepared an illustrated note for *Facts and Comments of American Antiquity* based upon the best specimens in the Graffham collection.

In the fall of 1959, Dr. William J. Mayer-Oakes joined the University of Oklahoma staff as Director of the Stovall Museum, and upon invitation from Bell a joint effort was made to obtain financial support for a preliminary study of the site. Funds for this purpose were made available by the Oklahoma Frontiers of Science Foundation, the Alumni Foundation, and the Faculty Research Committee of the University of Oklahoma; consequently, the period from January 23 to February 7, 1960 was spent in a pilot investigation of the El Inga locality. In this preliminary study it was hoped to achieve several things: (1) to locate the actual site from which Graffham had collected his specimens; (2) to make additional surface collections from the site; (3) to conduct simple test excavations to establish whether or not further work would be desirable; (4) to briefly examine the surrounding area to see if other sites were present; and (5) to establish contact with Ecuadorian officials and persons interested or concerned with the archaeology of the region.

All of these goals were accomplished in the brief time available. This was possible because of the genuine interest and wholehearted cooperation of individuals living in Quito, acting either in an official capacity or because of their personal interest. Mr. Jerry James, Cultural Officer of the American Embassy staff, and Matilda de Ortega, member of the Casa de la Cultura staff, were extremely helpful in introducing the writer to officials and persons interested in Ecuadorian prehistory. Sr. Julio Endara, President of the Casa de la Cultura authorized our fieldwork at the site and appointed Maria Angelica Carluci de Santiana as the representative of the Casa in the field activity. Dr. Antonio Santiana, Director of the Museo Etnografico, Universidad Central, and Maria, his wife, had been studying the chipped-stone industries of Ecuador, and a report was then in press (Carluci de Santiana 1960a). Sr. Carlos Manual Larrea, Vice President of the Casa de la Cultura, Ecuadorian scholar and author, permitted the examination of his personal collection and called attention to obsidian artifacts he had found near Tumbaco many years previously. Jan Schreuder and his wife accompanied the field party and helped collect surface specimens. Mr. George E. Richardson of the Inter-American Geodetic Survey loaned surveying equipment and helped in obtaining transportation and maps of the region. All of these individuals, as well as others not mentioned, helped in numerous ways and offered encouragement in this study.

With Graffham's directions, the site was located without difficulty and extensive surface collections of both obsidian and basalt artifacts as well as chip debris were made. Two 5'-square test pits were dug in different sections of the site, and the depth of occupational debris was established. Two nearby additional sites, Lozon and Ruvia Cocha, were located, and surface specimens were collected. With permission of the Casa de la Cultura, all of the materials collected were packed and shipped to the University of Oklahoma for study. A report upon the 1960 collections is being prepared by William J. Mayer-Oakes as a separate paper.

As one result of the 1960 fieldwork, it was evident that enough of the site remained to merit excavation, and plans were made to obtain the necessary financial support. During this time, preliminary notes reporting the additional information were published (Mayer-Oakes and Bell, 1960a, 1960b, 1960c).

In December 1960, a grant was obtained from the National Science Foundation of Washington, D.C., to carry out the excavations at El Inga, and arrangements were made to conduct the fieldwork during the months of June, July and August of 1961. Since Mayer-Oakes had a commitment for fieldwork in Canada, the excavations at El Inga were directed by Bell. Mr. James A. Neely, a graduate student from the University of Arizona Department of Anthropology, served as assistant director and field supervisor.

Bell and his family arrived in Quito on June 6, 1961, for a period of approximately three months during which time the excavations at El Inga were conducted. Preliminary preparations were necessary and included obtaining permission from the Casa de la Cultura to conduct the excavations, the purchase of certain supplies and equipment, procurement of a vehicle for transportation, employment of workmen for a field crew, etc. In all of these matters, Sr. Carlos Manuel Larrea, Dr. Antonio Santiana and his wife, Maria, were extremely helpful and graciously gave their time and attentions to our requirements. Sr. Benjamin Carrion, President of the Casa de la Cultura and Sr. Larrea, Vice President of the same institution, provided official authorization for the excavations, and Mrs. Santiana was appointed as representative of the Casa to observe the excavations. Mr. Harold G. Conger of the Servicio Cooperativo Interamericano de Salud Publica provided the loan of a vehicle for the daily transportation of personnel and equipment from Quito to the site. Dr. Pedro Leopoldo Nunez, owner of the land upon which the site is located, sanctioned the excavations and made a special trip to explain the mission to his tenent farmers living near the site. In addition, several other persons contributed to the success of the fieldwork in one way or another. Mr. Max Grossman, the Cultural Affairs Officer of the American Embassy, and his wife, Manya, helped in solving local problems as they arose and maintained a keen interest in the activities throughout the season. Dr. Isadoro Kaplan, Quito physician, joined occasional field trips and supplied additional background information about the site of El Inga.

Acknowledgment and appreciation is also expressed to the following individuals: Dr. Gerardo and Alicia Reichel-Dolmatoff, Mr. and Mrs. Hugo Deller, Sr. Cesar Vazquez Fuller, Mr. Herbert Hunter, Dr. Paulo de Carvalho Neto, Mr. Joseph L. Ramsey, Padre Pedro Porras Sr. Jorge A. Ribadeneira, and Mr. Rolf Blomberg.

During the intervening period from the 1960 season's reconnaissance and the 1961 excavations, Dr. Antonio Santiana and his wife, Maria Angelica Carluci, continued their research on the chipped-stone industries of Ecuador and had made extensive surface collections from a number of sites (Carluci de Santiana, 1960b, 1961). Their search had located additional sites in the vicinity of El Inga as well as close to Quito and Alangasi. Accompanied by the Santianas, field trips were made to a number of these sites and additional surface specimens were collected at that time. The Alangasi mastodon discovery locality reported by Uhle (1928) and the site of Urcu Huaico in the Alangasi area were visited. The sites of Lozon, Santa Lucia, San Cayetaino, and San Juan, all within the general region of El Inga were also investigated. In addition, Bell and Neely collected surface materials from several other sites: Reis Chupa, Itul Cachi, Ruvia Cocha #1, Ruvia Cocha #2, Papabamba, and Oyambaro (Fig. 1). The Santiana's have a large collection of artifacts from most of these sites, as well as from others which were not visited, and these are being studied by Mrs. Santiana (Carluci de Santiana, 1963). She is preparing a report upon these materials for presentation as a dissertation for the Ph.D. degree at the University of Buenos Aires. In view of the importance of her work, the author provided the labor and equipment for minor test excavations at two of the above sites: Santa Lucia and San Cayetaino. The test excavations were supervised by Mrs. Santiana and the results of the work are not included herein, but will supplement her research and will be included in her report on the region.

From the information already collected by the Santianas and our own limited reconnaissance, it is quite clear that there are a number of sites in the region between Tumbaco and Alangasi containing obsidian and basalt tools which represent a lengthy pre-ceramic occupation.

EL INGA SITE LOCATION AND DESCRIPTION

The site of El Inga is located in the province of Pichincha, Ecuador, approximately 22 km east, by road, from Quito. More specifically, it is located 8 km southeast from Tumbaco on the west side of Rio Inga which provides its name for the site (Fig. 1). The country road from Tumbaco to the Hacienda of San Juan passes along the eastern edge of the site where it begins a winding descent to cross the Rio Inga Canyon bridge. Immediately to the south of the site and within view of the bridge, the quebrada Rumiloma empties into the Rio Inga from the west. The Rio Inga flows northward to join the Rio Chiche just east of Tumbaco, where it continues northward to ultimately

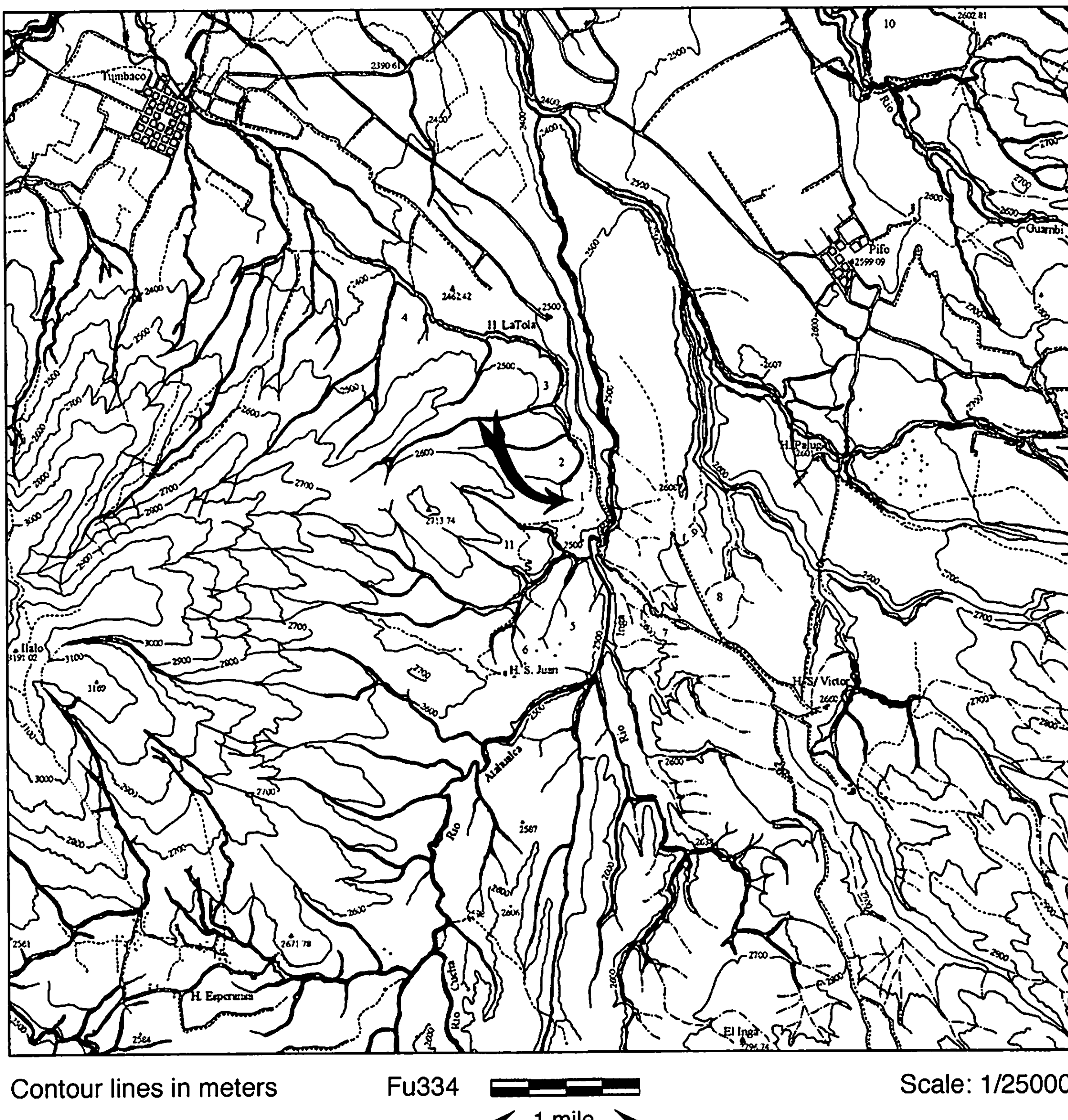


Figure 1. Location of El Inga and other sites in the vicinity: (1) El Inga; (2) Reis Chupa; (3) Santa Lucia; (4) Lozon; (5) San Cayetaino; (6) San Juan; (7) Itul Cachi; (8) Ruvia Cocha # 2; (9) Ruvia Cocha # 1; (10) Oyambaro; (11) Papabamba.

become a tributary of the Guaillabamba river system that empties into the Pacific Ocean at Esmeraldas.

From the site of El Inga, Ilalo Mountain dominates the landscape on the west, while the broad Rio Chiche valley extends toward the north and south (Plate Ia). Across the valley to the east, a range of mountains parallels the Rio Chiche valley to provide the final barrier before entering the montana region and the Rio Napo drainage of the Amazon.

The Rio Chiche valley region around El Inga appears to represent a flat broad valley, but this panoramic view (Plate Ib) is deceptive for the valley is dissected by many canyons and quebradas. Many of these are cut to a depth of several hundred feet, often with precipitous side walls which make survey or cross-country travel difficult. The valley appears to have been filled with volcanic debris, and it is now being dissected by rapid erosion caused by streams that are cutting through these volcanic deposits.

The site of El Inga is located on the surface of this filled valley floor at an elevation of approximately 2550 m above sea level. Immediately to the east is the Rio Inga canyon that has been cut to a depth of between 300 and 400'. Toward the west, the land generally tends to slope upward to Mount Ilalo although encroaching quebradas to the south, southwest and northwest of the site have eroded into the slopes to isolate the site area. Consequently, the site occupies the highest part of the remaining land surface at this point with erosion encroaching upon the area from all directions. In fact, all but a relatively small section of the occupational zone at the site has been eroded away.

The region around the site is presently occupied by numerous farmers who cultivate small plots of land or tend to livestock. Most of the land area that is not denuded of soil is under cultivation. Vegetation is sparse, limited for the most part to coarse grasses or small shrubs; trees are rare and for the most part limited to modern plantings of eucalyptus or fruit trees.

Fossil animal bones are commonly found in the area around the site. The bones and teeth of the mastodon, camel, horse and sloth were observed and collected by Graffham, and many of the local farmers know of localities where large bones are exposed by erosion. Dr. Isadoro Kaplan of Quito has collected numbers of fossil bones, including mastodon, from the quebrada immediately southwest of the site. He also reports the finding of one fragment of mastodon tooth enamel on the surface of the site at El Inga. Dr. Kaplan first collected obsidian artifacts from the site at El Inga in 1947 when he came across the obsidian debris while hunting fossil animal bones nearby. Kaplan later directed Graffham to the site in 1955 or 1956, and, in subsequent trips, Graffham collected the materials which focused our attentions upon this locality.

The site of El Inga occupies a low promontory which has been subjected to extensive erosion. Judging from the occurrence of surface debris, the site appears to have extended over an oval shaped area about 500' wide and 750' long (Fig. 2). Surface material can be found outside of this area, but erosion has clearly displaced some of the surface debris from its point of origin. The above estimate of site area is at best an approximation based upon topography, test pits, and distribution of surface materials. At the present time, however, the actual remaining site area is much smaller than this, for erosion has reduced the occupational area to perhaps one-tenth of its original size. This remains as an erosional remnant on the highest part of the site with several other smaller areas remaining elsewhere. The exposed eroded surfaces surrounding these erosional remnants are represented by a more durable material known locally as cangahua. The occupational mantle of soil rests upon the cangahua (Plate IIb), and, as erosion removes the overlying soils, the cangahua becomes exposed. The artifacts formerly contained in the overlying soil mantle come to rest upon the cangahua surface, which is more resistant to weathering. Consequently, the eroded cangahua surfaces were strewn with occupational debris derived from the soil mantle. The extensive surface collections made by Bell and Mayer-Oakes in 1960 were derived mostly from this area, and, together with the Graffham collection, they probably constitute the major portion of total objects existing at the site.

Surface debris is also to be found eroding out of the remaining portions of the occupational mantle as well as upon the top surfaces which have been subjected to plowing. The erosional remnants that remain have all been subjected to cultivation, and the southern section of the site is still used for growing corn. All parts of the remaining areas have been cultivated, however, as old furrows or evidence of cultivation are still to be observed. The cultivation aids in the continuing erosion of the remaining soil deposits, however, and the useful crop area gets smaller and smaller until it is finally abandoned all together.

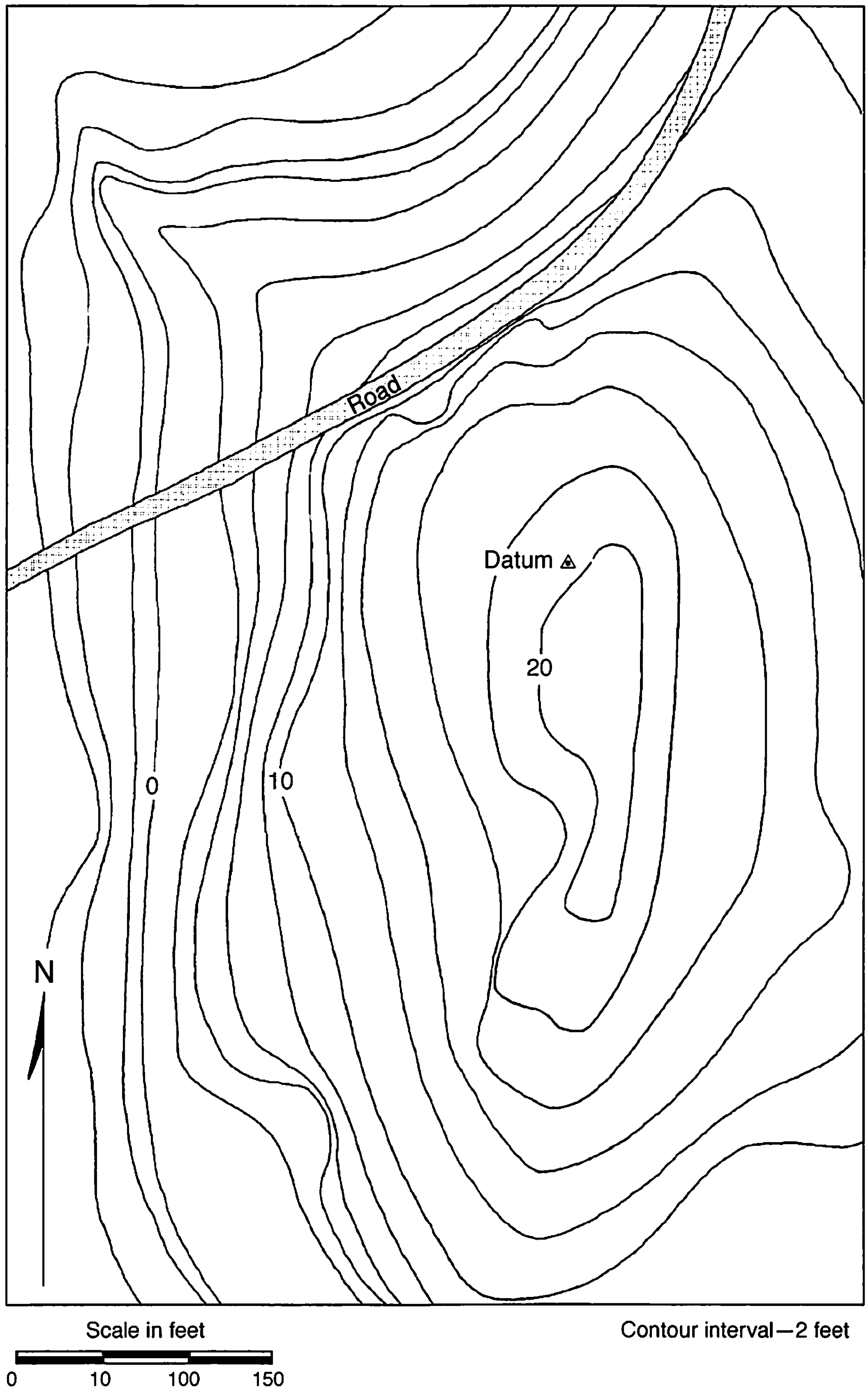


Figure 2. Topographic map of El Inga site, Ecuador.

The erosion that has taken place in the occupational mantle has produced irregularities in the surface of the soils remaining, especially around the edges of the erosional remnants. Consequently, the thickness of the soil mantle may vary from merely an inch or less up to its maximum depth at the thickest part where erosion is minimal. Because of this unevenly eroded surface, specimens picked up on top of the ground may have originated from the deepest part of the occupational zone.

A narrow roadway leading to the Hacienda of San Juan crosses the site to divide it into two unequal portions. This roadway is little used except for foot travel or livestock although ruts up to several inches in depth have been cut into the cangahua in some places. The section of the site to the north of the road appears more heavily eroded although some erosional remnants still are present.

Much of the site is free of vegetation, but tufts of coarse grass and small shrubs are present. Most of the plant growth occurs upon the erosional remnants rather than upon the exposed cangahua. Some plants do, however, occur on the cangahua, chiefly in spots where irregularities have trapped a pocket of soil or wind-blown sand.

The site itself is part of a larger range area used for grazing livestock, especially goats, and the local residents are commonly crossing the area en route to fields or to visit neighbors. An occasional fragment of glass, a bit of modern glazed pottery, or a dried banana peel reminds one that the site is not isolated from the contemporary scene.

DESCRIPTION OF EXCAVATIONS

The primary purpose of the 1961 fieldwork was to obtain archaeological evidence concerning the prehistoric occupants of El Inga. The occurrence of fluted, fish-tail base projectile points, resembling those found in the lowest levels at Fell's Cave in Chile, gave promise not only of furnishing data upon the early inhabitants of Ecuador, but in supplying new evidence which would be useful for understanding early man's movements throughout South America. It was necessary to obtain examples of this point type from carefully controlled excavations in order to identify an archaeological assemblage and to learn as much as possible about this assemblage. In striving to achieve this goal, it was planned to excavate a large portion of the site to obtain as many artifacts as were available in their proper stratigraphic relationship.

It was also hoped to obtain charcoal for radiocarbon analysis, to locate any occupational features that might be present, to obtain any animal or human bones that might be associated with the occupation, and to learn whether the site contained a single or multiple archaeological complex. In addition, samples of obsidian were to be collected specifically for the obsidian dating research project being conducted by Dr. Clifford Evans of the Smithsonian Institution, United States National Museum at Washington, D.C. To aid in this research, soil temperature readings were to be taken, and Dr. Irving Friedman of the United States Department of the Interior Geological Survey, Washington, D.C., provided instructions and a specially made thermopile and soil auger for that purpose.

A few items of equipment were shipped from Oklahoma to Quito for use in the field. These included such things as cameras, an alidade with tripod, plane-table and stadia rod, steel tapes, marking pens, record forms, and minor articles which may not have been readily available in Quito. Other articles such as shovels, mattocks, trowels, brushes, string, sacks, plastic bags, glass jars, metal hardware cloth, wood stakes, etc., were obtained in Ecuador. Upon the close of the fieldwork activities the useful equipment which had been locally purchased was donated to the Casa de la Cultura.

The actual excavations at El Inga were initiated on June 20, 1961, and continued until August 23, 1961, a period of slightly more than two months. During this time the field crew varied from 4 to 23 workmen, derived chiefly from the rural population surrounding the site (Plate IIa). During the initial phases of excavation, only four workmen were used, but the crew was rapidly enlarged to the maximum number, which was maintained throughout most of the season. Toward the close of the excavations, a reduced crew finished up work on one stratigraphic block and finally refilled the trenches.

The excavations were centered upon the highest section of the site within the largest of the erosional remnants still present. This is the section that had been previously tested by Bell and Mayer-Oakes in 1960 and appeared to offer the most promising locality. Additional remaining areas of the site were examined by three test pits consisting of two squares each.

A datum point was established upon the can-

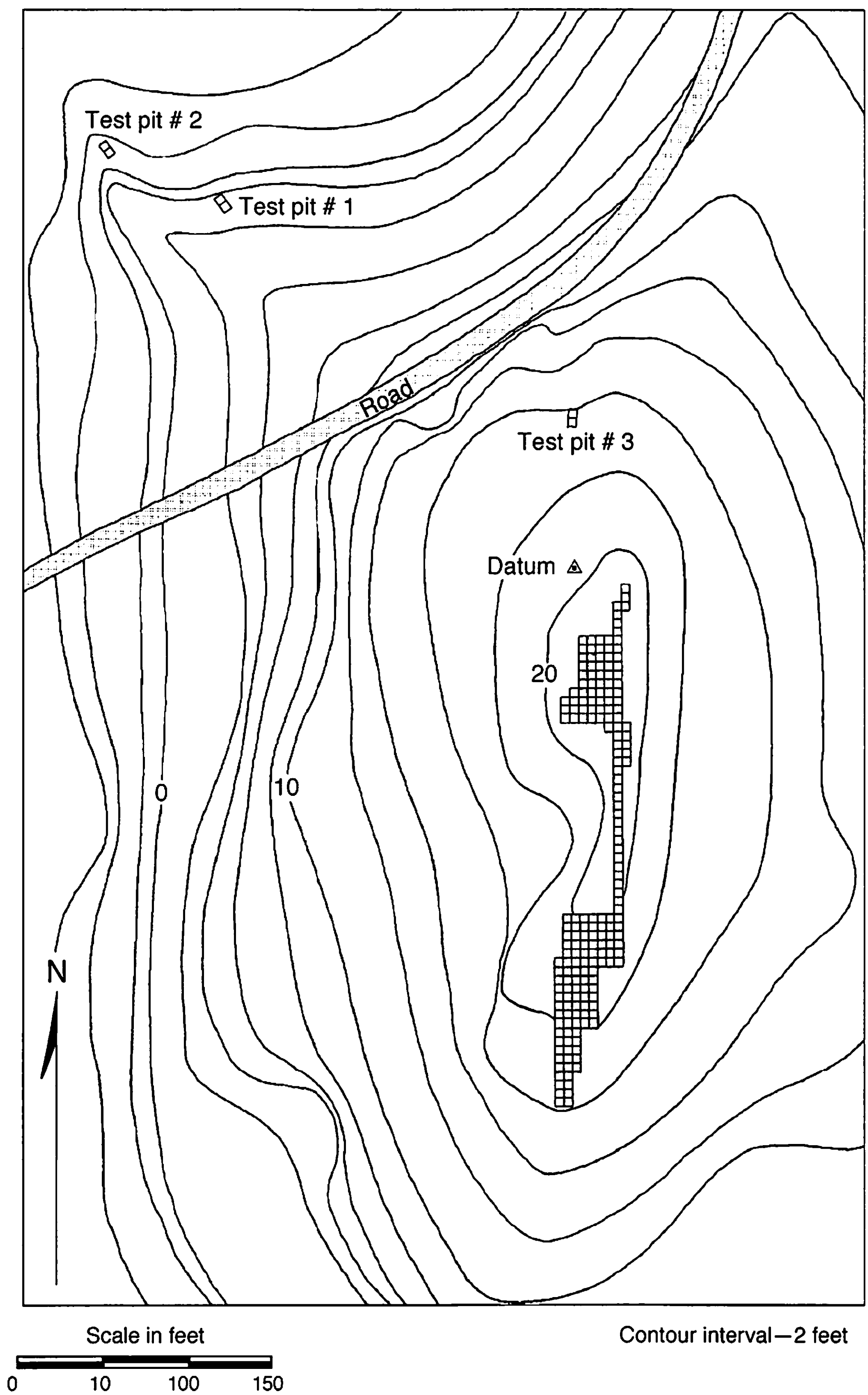


Figure 3. Contour map of El Inga site and location of all excavations.

gahua surface in a location that would not be disturbed by the fieldwork (Fig. 3). For this datum, a 3' iron pipe was driven into the cangahua but was allowed to project slightly above the ground surface. This pipe served as a basic datum for all surveying with all horizontal and vertical measurements being based upon this point of departure. To facilitate vertical measurements by avoiding plus and minus readings, the datum plane was assigned an arbitrary level of +20', and all vertical measurements were made with reference to this plane. Throughout the season, a contour map based upon 2' intervals was prepared (Fig. 3), and the surface of the ground at each stake was recorded. Horizontal and vertical measurements were taken from datum or a grid stake which served as a secondary datum.

A grid system based upon 5' squares was superimposed upon the site by the use of an alidade (Fig. 3). Two zero coordinates, one running north and south and the other running east and west, were used as base lines. Additional grid lines placed at 5' intervals to the north or south were numbered in consecutive order from zero, S1, S2, S3 or N1, N2, etc. Grid lines to the east or west were labeled as left or right when facing north, L1, L2, L3 or R1, R2, R3. Each individual square was designated by the stake located in the southeast corner. The three test pits were not considered as a part of this primary grid system, but were merely labeled by number and plotted upon the master map plan.

The placement of the grid system upon the site was determined chiefly by the irregular outline of the erosional remnant. It was desirable to have the initial exploratory trench extend as far as possible across the site to provide an interrupted profile. Hence, the north-south coordinate was placed to provide a guide for the exploratory trench which ran for a length of 210'. This trench was then extended westward for 35' and southward for 80' so as to include the most southern section of the site. From this, a north-south cross section of the occupational layer was available for almost the entire length of the remnant area (Fig. 4).

Utilizing the information derived from this exploratory trench, additional squares were excavated in the areas which appeared to be the most fruitful. Consequently, two major areas were excavated, one at each end of the exploratory trench in the widest parts of the erosional remnant.

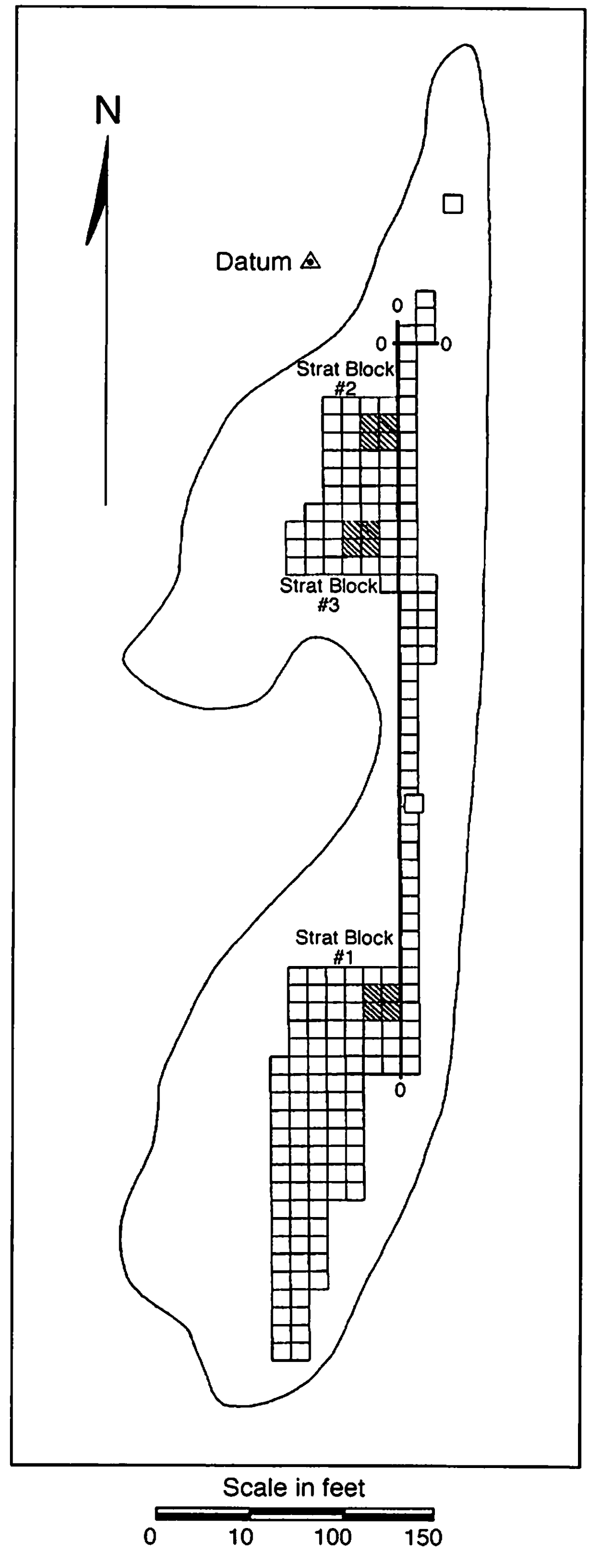


Figure 4. The 1961 excavation grid and location of stratigraphic blocks.

The 1960 test pits had indicated an occupational mantle having a depth of 18 to 20", unmarked by any distinct strata differentiation other than the lighter colored plow zone at the surface. In view of the shallow deposit and the need to look for stratigraphic differences, the excavations were made by use of arbitrary levels, 4" in thickness, measured from the ground surface.

Throughout the excavations the workmen were instructed to proceed with caution and to be alert for artifacts, charcoal, bones, stones or rocks, color changes in the soil, differences in soil texture or compactness, or any unusual change or discovery. When such an item was found, it was called to the attention of the field supervisor for observation or recording. The workmen were also informed as to the importance of properly associating the objects from each level with the proper sack, and items of doubtful provenience were either thrown away or kept as a part of a general surface collection.

The excavation of an individual square was normally done by two workmen. One man using a shovel, mattock, and trowel would excavate the earth from a single level while his partner screened the dirt for artifacts or debris. All of the dirt from the excavations was screened through a 1/4 inch mesh hardware cloth, and all items found in the levels were collected in a paper sack marked with the site, square, level, depth, and date. Individual artifacts, when found and located in situ, were recorded separately within the square by position and depth. Upon completion of the level the walls and floor of each level were planed with a trowel, shovel, or mattock for observation. A level report form was then filled out by the supervisor, and excavation of the next level was continued.

The number of levels removed within each square varied somewhat from one section of the site to another depending upon the irregularities of the surface as well as the underlying cangahua. In the majority of squares, either four or five 4" levels were removed, but in squares which were situated in more eroded areas, three levels would remove the occupational deposit. In one or two instances, where the eroded cangahua surface had low areas in it, an additional level was sometimes required. In the early part of the work, the squares were excavated for several inches into the cangahua in order to be sure that it was sterile and that it did not contain artifacts or evidence of occupation. As it became clear that the cangahua was sterile, however, square excavation was usually terminated with the level that included the top section of the cangahua. Since work was progressing in 4" levels, this sometimes meant removing 1" up to perhaps 4" of cangahua, depending upon the surface irregularities of the cangahua.

In some instances, the 4" interval would fall about on the contact between the cangahua and the overlying soil zone. In such cases the cangahua was not removed unless the contact level had produced more than one chip or item of debris. The general rule of thumb was to continue square excavation until the last level was sterile, or almost sterile, and in contact with or excavated into the cangahua.

In the area of contact between the cangahua and the overlying soil zone, the occasional finding of a single chip was not considered as significant since the irregular and fissured surface would be filled in with soil. In brief, when leveling the floor of the square at this unconformity between the cangahua and the soil mantle a predominance of cangahua and absence of debris meant abandonment of the square.

Aside from the plowed zone, the soils at El Inga were very hard and compact which necessitated the use of mattocks to loosen the soil in excavation. Consequently, some artifacts were broken or damaged by the workmen although many of them became quite skilled at manipulating this heavy tool. Moreover, some specimens were not discovered until they were exposed in a crushed clod of dirt or by the screening. In such cases, the association with the level is known, but the exact position within the level is uncertain.

Stratigraphic Blocks

Three stratigraphic blocks were excavated during the season. Their main purpose was to provide a more sensitive sequence of arbitrary levels within the occupational deposit and to provide soil samples which might be useful for radiocarbon dating, pollen analysis, or soil analysis. Stratigraphic Blocks #1 and #2 were placed at the south and north ends respectively of the excavated area after the initial north-south exploratory trench had been completed. The third stratigraphic block was placed in an area believed to be somewhat more productive in artifacts and debris, based upon evidence from squares already excavated (Fig. 4).

Each stratigraphic block was 10' square and, hence, included four squares of the grid system

(Plates III-V). Each block was carefully excavated by 2" levels, measured from the ground surface. Excavation of the stratigraphic blocks was done either by Bell or by two workmen who were trained for that specific purpose. When the stratigraphic block had been selected for excavation, all squares adjacent to it were excavated in order to isolate the block from the surrounding area. This made excavation of the block easier and, at the same time, prevented any possible admixture with artifacts from nearby squares. Each control block was prepared in this manner prior to any actual excavation of the block.

The excavation of each stratigraphic block preceded by removing a 2" level from one quadrant, or one of the four quarters. As one quarter was removed and the second quarter started, a strip of soil for depth control was left along the grid line to separate the four quarters. When the first 2" level was finally removed from all quarters, the central control strips were then removed except for a small portion at the center which served as a control block for the removal of subsequent levels. The floor of each level was carefully troweled for possible features or disturbances, photographed, recorded, and then the same procedure was followed in excavating the subsequent levels. Each stratigraphic block was excavated to the contact with the underlying cangahua, and finally the remaining control pillar at the center was removed.

The excavation of the stratigraphic blocks was a slow and time consuming process. Each level was removed by trowel or mattock, and almost all artifacts recovered were observed and measured in situ. The hardness of the soil made it difficult to remove more than about one level per day, and yet this hardness of the soil helped in keeping the exposed block from slumping or breaking down around the sides and corners. As the block became dried out, especially over a week end when it was not being worked, it was sometimes necessary to moisten the soil with water to continue excavation.

Test Pits

Three test pits, 5 by 10' in size, were dug in sections of the site outside the main area of excavation (Fig. 3). These were placed within other isolated erosional remnants of the site for testing and evaluation. Each test produced a similar profile to that of the main excavation and confirmed the presence of the occupational layer over a more widespread area. As these tested areas offered no greater promise than the main area of investigation, the squares were refilled and efforts were directed to a single locality.

Observations

A cross section of the site revealed a simple profile composed of two distinct deposits: a dark colored soil mantle containing the artifacts and occupational debris, and the underlying cangahua which was sterile (Fig. 5; Plate IIb). The surface of the cangahua was very irregular and weathered, its light color contrasting with the dark colored soil mantle resting upon its surface. The soil mantle extended from the cangahua contact up to the present surface and in most places averaged between 16 and 18" in thickness. This could be differentiated into two clear cut zones; the upper lighter colored section, from 3 to 9" in thickness resulted from plowing, and the lower dark colored section was very hard and compact. This lower dark colored section varied slightly in color in some areas; it was darkest about 5 or 6" above the cangahua surface and became slightly lighter in color both above and below this area. This darker zone within the soil mantle may indicate a period of more intensive occupation.

The upper portion of the occupational mantle, designated as the plowed zone, varied in thickness from 3 to 5" at the north section of the site to as much as 8 or 9"at the south end. In view of this variation and the lighter color, the possibility that it might represent a natural deposit was seriously considered. The area of contact between the two zones was examined at the stratigraphic blocks as well as elsewhere, and in several cases the marks resulting from the plow tip were evident upon the troweled surface. Furthermore, at localities where these could be checked with old but visible furrows, the plow tip lines matched the deepest part of the furrow. Consequently, there is no question but that the top portion of the occupational mantle is distinguishable only because of the cultivation. The lighter color is probably produced by the addition of wind blown sand which became mixed with the soil during cultivation.

Dr. Charles Mankin of the School of Geology at the University of Oklahoma analyzed one sample of cangahua and several samples of soil taken from different levels of Stratigraphic Block #3. Aside from the organic matter present in the soils as the result of occupation, the soils and cangahua are identical in their composition. These studies also indicate that the material is of volcanic origin and that the soils were derived from the underlying cangahua.

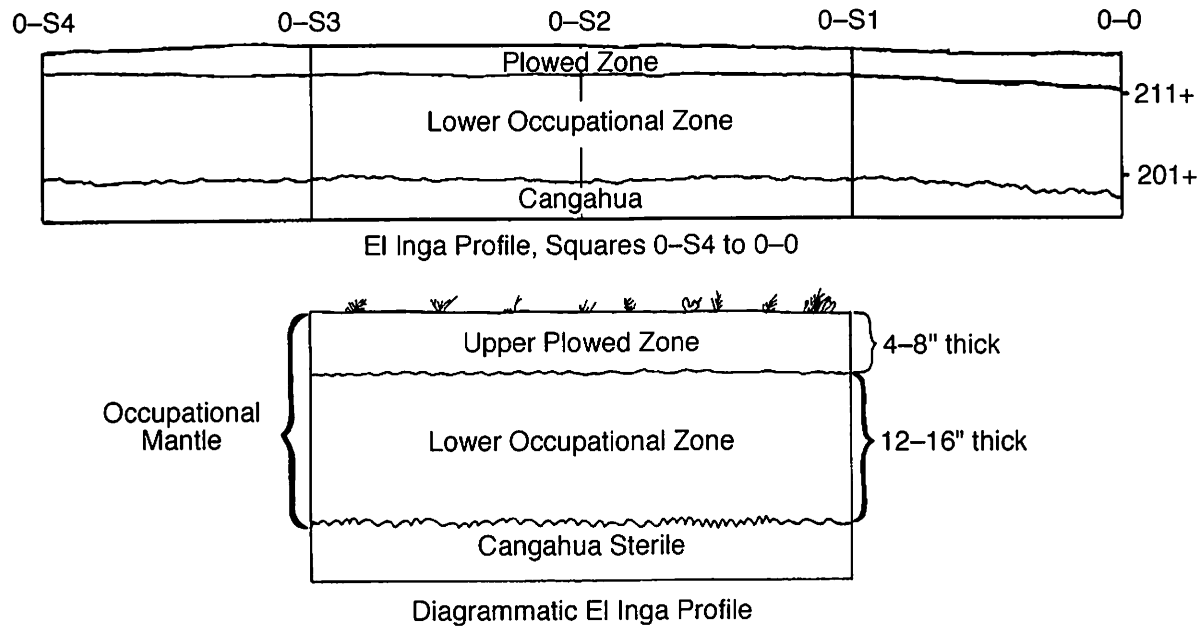


Figure 5. Soil profiles at El Inga site.

It was anticipated that some features such as a hearth or fireplace might be found during the excavations. This was not the case, however, and nothing found was designated as a feature throughout the entire digging season. In fact, each newly excavated square was quite like the previous one, producing only chips of obsidian or basalt and the occasional stone artifact. The only items which might have been designated as features were concentrated areas of obsidian chips which are discussed along with the artifacts as chip caches. These are represented by chips of obsidian and an occasional artifact, which were found together in a restricted spot, usually less than 8 or 10" in diameter. It is not clear whether these actually represent an intentional cache of chips of raw material or whether they may have become concentrated together in some other manner. They certainly represent concentrations of flakes within a specific limited area, but this could result from water action or as a byproduct of tool manufacture as well as an intentional cache.

Every effort was made to obtain charcoal for radiocarbon dating, and the crew was instructed to watch carefully for charcoal, ash, or any evidence of fire or a hearth area. The dark color of the soil suggested that organic matter was present, and a chemical analysis made by John Schleicher and Charles Mankin of the Oklahoma School of Geology on soil samples collected in 1960 indicated the presence of carbon in amounts between two and three percent. The presence of visible particles of charcoal during the excavations, however, was very limited. The largest particle of charcoal observed during the season measured no more than 2 mm in maximum length, and most examples were evident only by a black fleck or black smear which would appear upon a scraped surface. Even such meager indications of charcoal were rare throughout the site, and when found in any quantity or within a limited area, a soil sample containing the particles was collected for possible radiocarbon dating.

The recovery of bone specimens from El Inga excavations was also a disappointment in that little evidence of bone material was present. There are three fragments of animal teeth, primarily enamel, and one small fragment from an animal bone. The latter fragment, damaged beyond identification, came from level 1 (0 to 4"), which included the surface and may well be from refuse discarded by the present inhabitants. A small area of bone fragments was found in Stratigraphic Block #3 at a depth of 17" below the surface, and considerable time was spent working with pocket knives, teasing needles and brushes to carefully expose the fragments. Although it was hoped that some large identifiable pieces might be uncovered, nothing was found except a small area about 5" in diameter containing several bits of broken bone. The largest piece measured less than 3 cm in length and represents an unidentifiable fragment from a larger bone. Consequently, the three fragments of teeth represent the only potentially useful bone specimens from the site. These have been examined by Dr. David Kitts of the School of Geology at the University of Oklahoma who has made the following observations: the teeth are small and high-crowned; they are too small to represent cattle and bison are not known from South America; they are too low-crowned to represent deer; the structure as preserved is consistent with the hypothesis that the specimens represent the llama. Two specimens were found in level 2 (4 to 8"), and one specimen was found in level 5 (16 to 20"); all three came from the southern section of the excavation.

Every effort was made to observe potential features such as pits or disturbances, hearths, or scattered stones which might indicate evidence of occupation. The presence of any stone larger than five centimeters was carefully noted and left in place until the surrounding area could be investigated for additional stones or possible evidence of a fireplace or feature. The presence of stones of this size, however, was rare, and the total recovered from the entire excavation numbered only 11. These were unrelated to each other and only one specimen displays evidence of having been used in any way, although they certainly were carried to the site from elsewhere and must have served some purpose.

The absence of occupational features at El Inga, with the possible exception of the chip caches, limits our main source of knowledge about the inhabitants to information to be derived from the stone artifacts and chipping debris.

LABORATORY PROCEDURES, ANALYSIS AND ARTIFACT DESCRIPTIONS

Laboratory Procedures and Analysis

Throughout the excavations at El Inga, an effort was made to save all items found in the digging. These included not only artifacts, but chips of obsidian, flint or basalt, pebbles, stones or any object encountered in the excavation. The total available sample was obtained for the possible information it might provide in identifying areas of intensive occupation or in supplying data on stone working techniques. Occasionally a chip or flake would be discarded because of uncertain provenience, but such instances would certainly constitute less than 0.1% of the total sample.

The Casa de la Cultura in Quito authorized the shipment of all the specimens to the University of Oklahoma in Norman for analysis and study. The officials of the Casa, Sr. Carrion and Sr. Larrea, assumed the responsibility of preparing the necessary documents and papers to clear the Ecuadorian customs office and helped in various ways to facilitate actual shipment. The specimens were shipped by air freight from Quito to Miami, Florida, and from Miami to Norman, Oklahoma by truck transport. Mr. H. A. Messersmith of the United States Department of Agriculture Office in Miami, and Mr. E. A. Burns, of the Hoboken, New Jersey office, provided authorization for the soil samples and artifacts to pass through United States Customs without serious delay. All of the materials arrived at the Stovall Museum in Norman in good condition and without damage.

In the laboratory each individual sack of material was sorted to separate the artifacts from the debris. The artifacts were then washed, catalogued and crudely sorted into various categories-such as knives, scrapers, points, etc. The debris was replaced in its original sack for later study and analysis. This routine work was done, under supervision, by Don Wyckoff, Elizabeth Pillaert and Sigrid Schmitt and occupied a considerable number of man-hours for completion.

All items classified as debris were rechecked by Bell for each bag of material. It is quite possible, however, that some few items included with the debris may represent an unrecognized artifact or a fragment from a classifiable object such as a primary burin spall. It is sincerely hoped, however, that such oversights were minimal.

In the analysis which follows, the recovered materials are discussed under these two main categories: Debris and Artifacts.

Debris or Refuse Materials

Included in the debris material from El Inga are chips or flakes of obsidian, basalt or flint, small pebbles and stones. The total number of these items is 79,735 pieces with 78,878 having been found in the main area of excavation and 857 having been found in the test pits. The distribution of these items according to depth is shown in Table 1 and Table 2. Each class of objects will be discussed separately.

Plate Ia: View of rugged canyon setting near Tambuco north of El Inga site.

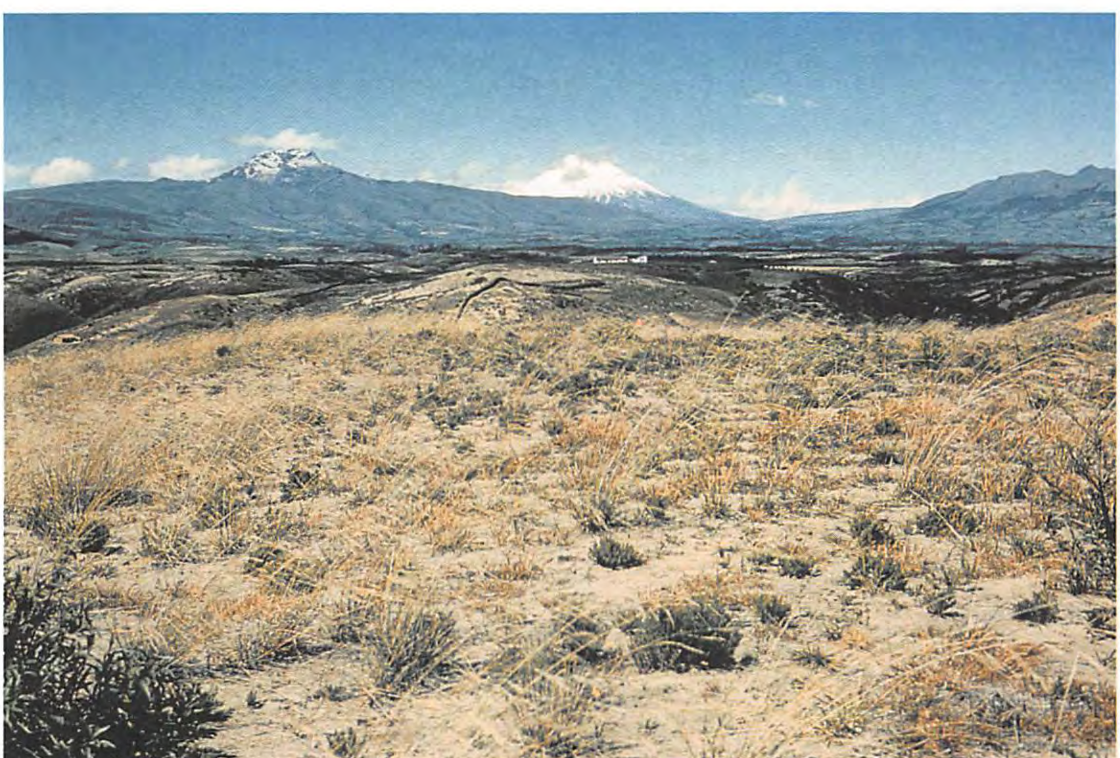


Plate Ib: Looking south across El Inga site; Cotopaxi volcano in the background.

Plate IIa: Workers excavating squares S1 and S2 of Right 1 trench.

Plate IIb: Soil profile at O-S25. Cangahua visible at base of profile.

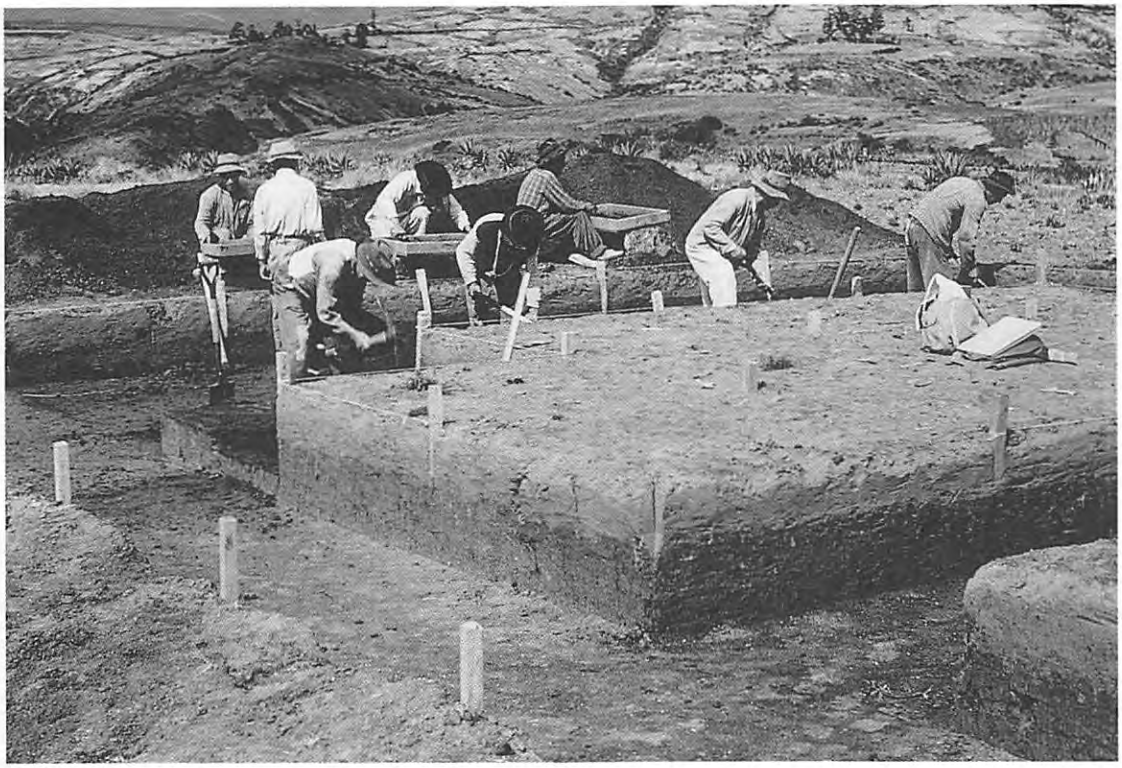


Plate IIIa: Crew clearing squares around Stratigraphic Block #1.

Plate IIIb: Level 1 removed from one square of Stratigraphic Block #1.

Plate IVb: Level 2 being removed from Stratigraphic Block #1.

Plate Va: Level 5 removed from Stratigraphic Block #1.

Plate Vb: Level 6 removed from Stratigraphic Block #1.

Plate VIa: View south across El Inga site after refilling.

Plate VIb: The El Inga crew and friends. July 28, 1961.

Table 1. El Inga debris: Distribution by levels excluding test pits.

Levels dug	Depth	Obsidian	N/L	Basalt	N/L	Flint	N/L	Pebbles	N/L	Stones	N/L	Total
193	0 to 4"	12,898	66.8	574	2.9	11	0.05	1,307	6.7	2	0.01	14,792
193	4 to 8"	17,921	93.3	410	2.1	15	0.07	581	3	1	0.005	18,928
190	8 to 12"	22,901	120.5	662	3.4	22	0.11	277	1.4	6	0.03	23,868
169	12 to 16"	17,793	105.2	578	3.4	12	0.07	295	1.7	1	0.005	18,679
146	16 to 20"	1,952	13.3	31	0.21	1	0.006	202	1.3	1	0.006	2,187
11	20 to 24"	389	35.3	3	0.27	0	0	21	1.9	0	0	413
1	24 to 28"	7	7	4	4	0	0	0	0	0	0	11
	Totals	73,861		2,262		61		2,683		11		78,878

Table 2. El Inga debris: From test pits.

Levels dug	Depth in inches	Obsidian	Basalt	Flint	Pebbles	Stones	Total
6	0 to 4	112	54	0	70	0	236
6	4 to 8	172	13	0	18	0	203
6	8 to 12	157	7	0	10	0	174
5	12 to 16	171	15	0	8	0	194
3	16 to 20	40	3	0	4	0	47
2	20 to 24	2	1	0	0	0	3
	Totals	654	93	0	110	0	857

Stones

The items herein classified as stones include specimens measuring from 4.5 to 13.5 cm in maximum length. Smaller stones have been classed as pebbles, and nothing larger than these were found in the excavations. All specimens are either whole or are fragments from large water worn pebbles of extrusive igneous rock similar to those present in the stream beds of the area. With a single exception, none of the stones shows any use or abrasive marks to suggest its former function at the site. One specimen discussed under Artifacts displays a series of parallel scratch marks or shallow grooves which may have resulted from use as an abrading tool.

Of the 11 stones found, 6 were at a depth between 8 and 12", which is also the zone containing the maximum number of other debris items. Two pieces were found in a single square, but otherwise they were widely distributed (Fig. 6).

Eight specimens were found in the northern section of the excavated area while only three came from the southern section. No particular significance is attached to the horizontal or vertical distribution of the stones except for the suggestion that the northern section of the site may have been more intensively occupied.

Pebbles

There is a total of 2,683 items classed as pebbles from the excavation. These are all under 4.0 or 5.0 cm in maximum length, and the great majority is much smaller, averaging around 1.0 cm in diameter. They include small stones or pebbles and angular fragments of rock derived from the region. Also included as pebbles are

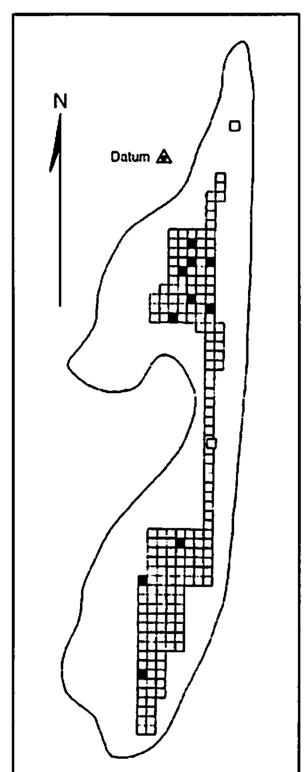


Figure 6. Distribution of stones including all levels.

small pieces of cangahua which stubbornly resisted the workmen's efforts to crush them through the metal screens.

The pebbles are most plentiful in the first level (0 to 4") and become less and less frequent as the depth increases. They are about equally scattered over the site area except in level 2 (4 to 8") where they are more plentiful at the south end of the excavation (Fig. 7). The vertical and horizontal distribution of the pebbles is believed to have no significance so far as the aboriginal occupants of the site are concerned.

Obsidian Chips

There is a total of 73,861 obsidian chips from the main area of excavation and 654 from the test pits. These include chips, flakes, or small irregular pieces of obsidian which represent refuse from artifact manufacture. The specimens range in size from less than 0.5 cm to a length between 6.0 and 7.0 cm, although the majority are less than 2.0 or 3.0 cm in length.

The obsidian appears to be of high quality for artifacts, and much of it is transparent with thin flakes being almost as clear as window glass. Most of the sample is a gray or black smoky color although some specimens of red or red-brown color are present. Stripes or variegations also occur, chiefly in the form of black streaks or bands running through the material. Occasionally, a flake exhibits one surface having a frosted or weathered effect, rather similar to the cortex which may occur on a flint nodule, which indicates that it was derived from a boulder or weathered nodule of obsidian.

The source for the obsidian used at El Inga is not established beyond question as this was not carefully investigated. Sr. Jorge A. Ribadeneira, Professor of Geology at the Universidad Central in Quito, said the nearest source for obsidian would be Mount Antisana, a volcanic peak located about 35 km southeast of the site. Both obsidian and basalt deposits are present at Mount Antisana, and this may be the point of origin for the raw materials at El Inga. Specimens from the Antisana locality and those from El Inga compare favorably, but additional unreported sources may be available elsewhere. On the basis of local knowledge, however, this appears to be the nearest source of supply to the site. Unfortunately, it was not possible to investigate the Mount Antisana region in the time available.

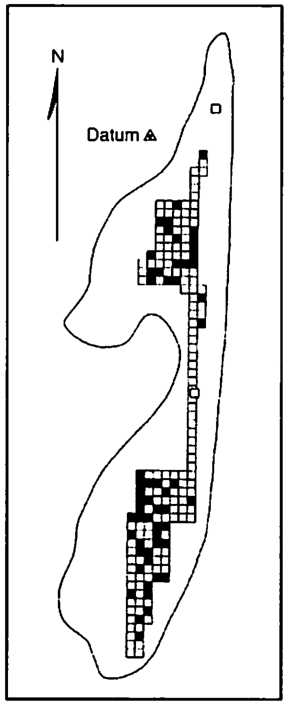
The obsidian chip debris represents the most common item found in the excavations, and it far outnumbers all other items in quantity. The distribution of obsidian chips according to the various levels is shown in Table 1 and Table 2. The total number of chips found in any single square ranged from a minimum of 42 up to a maximum of 1614. The total number found in any single level ranged from zero to a maximum of 1262. The major portion of all obsidian chips was found in the occupational mantle between 8 and 16" in depth, and the frequency tends to become reduced both above and below this zone. For comparisons between the various levels as shown in Table 1, the average number of chips per level has been shown under the column N/L. This expresses the relative number of chips for a specific volume of earth (5' by 5' by 4") and is obtained by dividing the total number of levels (L) into the total number of chips found in those particular levels (N). This has been done to provide a more realistic comparison between the various levels in terms of obsidian chip frequency. Obviously, the total numbers should not be used unless the total number of excavated levels is the same for all squares. Since the number of levels dug varied from square to square and became reduced at the lower depths, this should be taken into account.

In terms of vertical distribution throughout the site, the maximum number of obsidian chips occurs in level 3 (8 to 12") with level 4 (12 to 16") being next in frequency. The quantities decrease gradually above this zone and are considerably smaller in the lower sections of the occupational mantle.

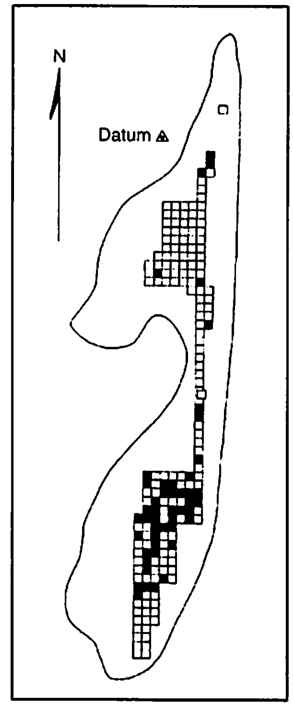
The horizontal distribution of obsidian chips throughout the various levels is shown in Figure 8. To illustrate this distribution, only squares having the average or more than the average number of chips per level have been designated. It is evident that the horizontal distribution of obsidian chips varies from one level to another; for example, in level 1 (0 to 4") they are more abundant in the northern section of the site while in level 4 (12 to 16") they are more abundant in the southern section. The significance of these distributional differences is not clearly understood although it presumably indicates shifting areas of occupational intensity or tool manufacture.

Basalt Chips

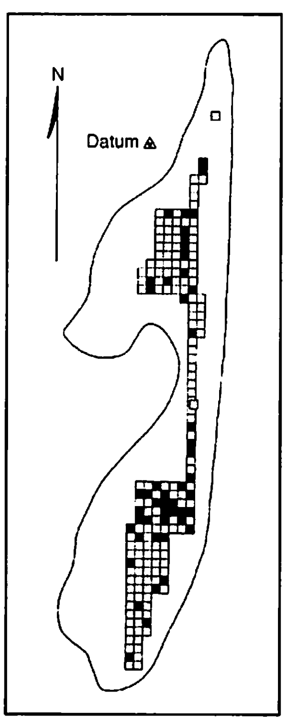
There is a total of 2262 basalt chips from the main excavation and 93 from the test pits. These include chips, flakes, and chunks of material probably derived from the manufacture of arti-



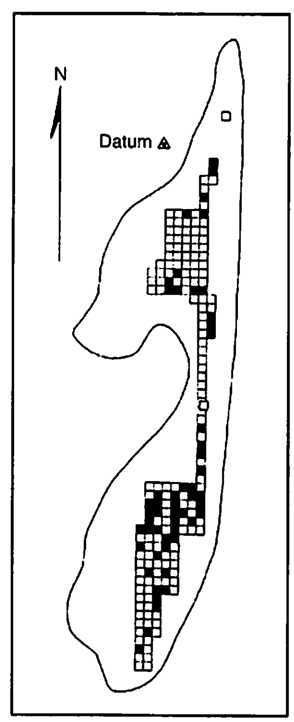
Level 1 (0–4")
Squares having
average number or more (7+)



Level 2 (4–8")
Squares having
average number or more (4+)

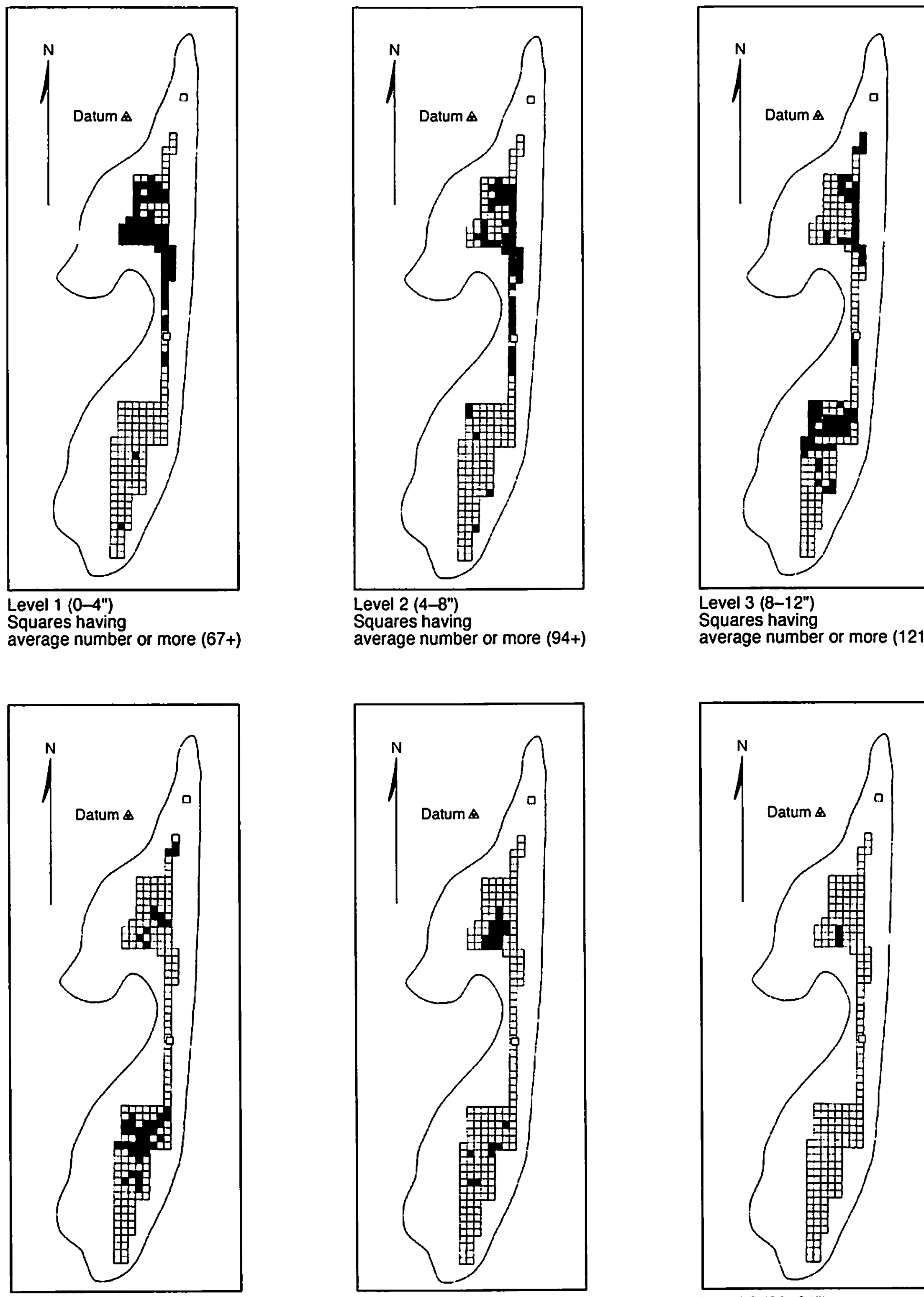


Level 3 (8–12")
Squares having
average number or more (2+)



Level 4 (12–16")
Squares having
average number or more (2+)

Figure 7. Distribution of pebbles



Level 1 (0–4")
Squares having
average number or more (67+)

Level 2 (4–8")
Squares having
average number or more (94+)

Level 3 (8–12")
Squares having
average number or more (121+)

Level 4 (12–16")
Squares having
average number or more (106+)

Level 5 (16–20")
Squares having
average number or more (14+)

Level 6 (20–24")
Squares having
average number or more (36+)

Figure 8. Distribution of obsidian chip debris.

facts. They range in size from less than 1.0 cm to 6.0 or 7.0 cm in length with the average ranging between 2.0 and 4.0 cm. In general, the average sample of basalt chips is somewhat larger in size than the average sample of obsidian chips.

Included as basalt chips are basalt, andesite and other extrusive igneous rocks which would fracture in a conchoidal manner. For this report, the general term basalt is used to refer to all of these materials. The source of this material is uncertain although deposits of basalt are available at Mount Antisana as in the case of the obsidian. Boulders of basalt are also to be found in the streambeds of the area.

The basalt chips are much more rare than chips of obsidian throughout the site. The vertical distribution according to the various levels is shown in Table 1 and Table 2. Like the obsidian chips, the basalt chips are most plentiful in the zone from 8 to 16" in depth and become less frequent both above and below this zone.

The number of basalt chips per square ranges from zero to a maximum of 185, and the number per level ranges from zero to a maximum of 144.

The horizontal distribution of basalt chips is illustrated in Figure 9. It follows essentially the same distribution patterns present for the obsidian chips and suggests that both obsidian and basalt were being utilized by the inhabitants at the same time.

Flint Chips

There is a total of 61 flint chips from the excavations. They are all fairly small in size and measure under 2.0 or 3.0 cm in length. Items classified as flint chips include flakes of flint, chert, or a similar silicious material excluding obsidian or basalt. Most of the specimens are represented by colors ranging from a light brown or tan to a dark gray. Flint in the form of artifacts or chipping debris is very rare at the site, and, although the possible source of supply is unknown, it was certainly carried into the site by the inhabitants.

The flint chips appear to be well scattered throughout the site area, and, like the obsidian and basalt chips, are most abundant in the zone from 8 to 12" in depth. The vertical distribution is shown in Table 1 and Table 2. The maximum number of flint chips found in any single square is four, and the maximum number from any single level is also four. Although the sample is small, the distributional pattern for the flint chips parallels that of other chipped stone refuse.

Comments Regarding Debris Materials

Stone debris materials at the site of El Inga include chips of obsidian, basalt, or flint, pebbles and stones. The pebbles are presumed to have no cultural importance in so far as the inhabitants were concerned and are believed to be present because of some natural agency.

The debris represents only a chipped stone technology, and there is no evidence for the grinding and polishing of stone. In fact, stones are very rare with only 11 being represented in a total of 78,878 collected specimens, and these show no indications of pecking, grinding, or polishing.

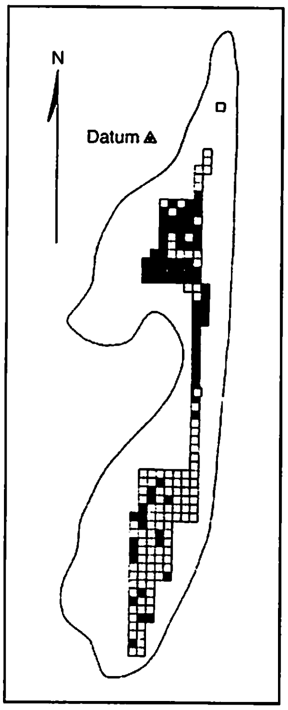
In chipped stone, obsidian is by far the most common material with basalt and flint representing a relatively small proportion of the total sample. All of the cultural materials appear to be most concentrated in a zone ranging from 8 to 16" in depth with a maximum number occurring in the upper part of this zone. The debris becomes less abundant both above and below this zone of concentration. The horizontal and vertical distributions of the various chips is essentially the same, suggesting that all materials were being worked by the same peoples at the same times.

The Artifacts

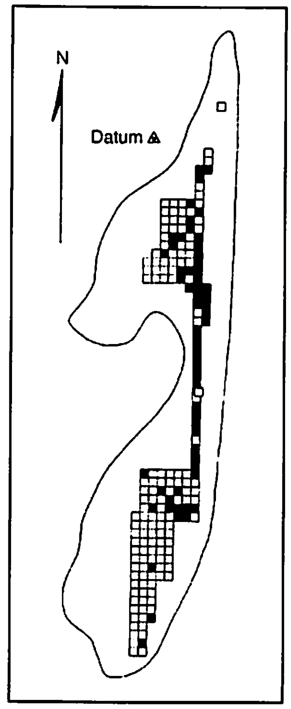
The artifacts found in the El Inga excavations present some difficulties in terms of classification which will become evident in the following discussion of the various objects. The vast majority of artifacts represented are specimens of chipped stone, primarily obsidian, although pottery sherds, one striated stone, and three pieces of hematite are present. Also, specimens such as primary burin spalls or secondary burin spalls are discussed along with the artifacts, whereas these objects might properly be considered as debris. They are included along with the artifacts, however, as they are believed to be of greater importance than random chip debris derived from the flaking process.

The various artifacts have been classified into groups or classes of objects which are believed to be meaningful for comparative purposes. It should be stressed, however, that this classification is not to be considered as final; other workers would probably classify some specimens differently, and additional research will certainly necessitate a reexamination and evaluation.

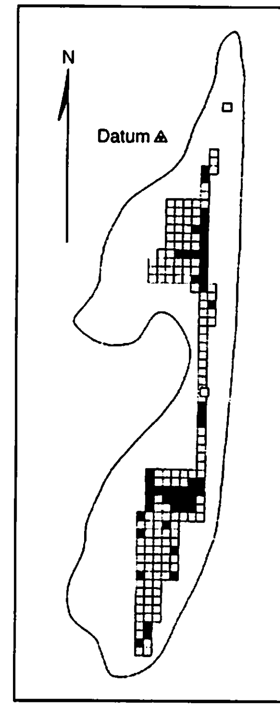
One difficulty in classifying the materials arises from the fact that many specimens are broken or incomplete; some broken fragments have



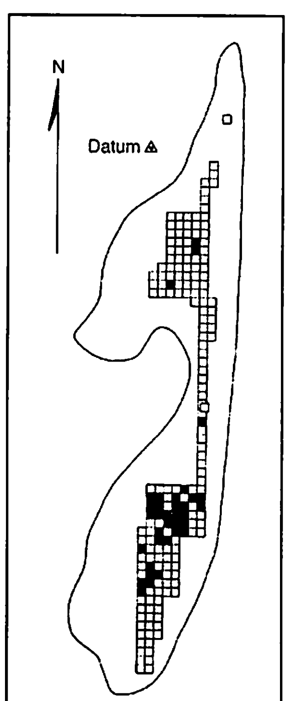
Level 1 (0–4")
Squares having
average number or more (3+)



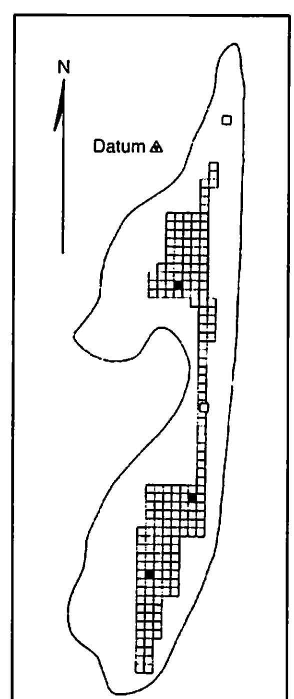
Level 2 (4–8")
Squares having
average number or more (3+)



Level 3 (8–12")
Squares having
average number or more (4+)



Level 4 (12–16")
Squares having
average number or more (4+)



Level 5 (16–20")
Squares having
average number or more (3+)

Figure 9. Distribution of basalt chip debris.

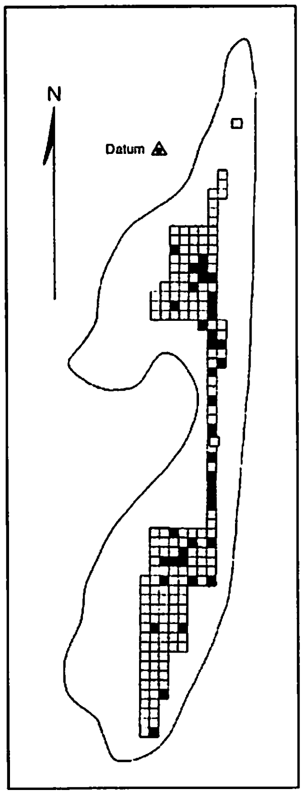


Figure 10. Flint chip distribution by squares.

been reworked to produce a different artifact. In addition, many items apparently served several purposes; for example, end scrapers often display one or more burin facets, or side scrapers have projections for perforating or graving.

A second difficulty arises from the fact that a number of the artifacts are of types that are not commonly found in archaeological sites with which the author is intimately familiar. A number of the specimens, such as burins, burin spalls, and retouched flakes, are more commonly found in European Upper Paleolithic context. The author's experience with this type of material is limited to small museum collections or illustrations in the literature, but this is not equal to first-hand field and laboratory experience gained from handling hundreds of specimens which include all kinds of variations. To help out in this matter, Dr. Jeremiah F. Epstein of the University of Texas examined a portion of the collections and pointed out the characteristics of certain types of artifacts, especially burins and burin spalls. Epstein's experience with Dr. Hallam L. Movius while working at Abri Pataud in France proved especially helpful in this regard. A limited number of specimens were also shown to Dr. James L. Giddings of Brown University for observation and comparisons with the Arctic Cape Denbigh materials which also contain burins, burin spalls and prismatic flakes. Dr. Junius Bird of the American Museum of Natural History in New York also examined a few specimens and offered comments regarding their similarity to materials from Fell's Cave in Chile. Mr. Masakaza Yoshizaki of the Hakodate Municipal Museum of Hokkaido, Japan, visiting at the University of Wisconsin, also examined the El Inga collections. Mr. Yoshizaki has been working with early obsidian complexes of northern Japan where blade and burin techniques are well known. Consequently, the El Inga material was of special interest to him. The observations of these persons have been very helpful in classifying the El Inga artifacts.

The specimens were first sorted into various classes such as projectile points, scrapers, burins, retouched flakes, etc. These were then reexamined to separate the various subdivisions within each class such as the various forms of projectile points or varieties of scrapers. Throughout this sorting process all specimens were carefully examined for evidence of wear or usage which would be helpful in classifying the object or in suggesting its former function. The glassy obsidian from which most of the artifacts were made is especially sensitive to scratch marks or abrasions caused from hafting or usage, and some artifacts display consistent patterns in worn surfaces.

Pottery Sherds

There is a total of 1711 pottery sherds from the excavations at El Inga. They have been grouped into two main classes, a prehistoric ware represented by reddish-tan colored sand tempered sherds, and a modern ware represented by glazed surface sherds. Both wares are believed to be limited to the plowed zone or cultivated section of the site as no specimens were ever observed "in situ" in the underlying compacted dark colored soils.

Glazed Pottery Sherds

There is a total of 43 pottery sherds exhibiting a glaze upon either one or both surfaces. They are certainly historic in origin and appear to be from cups, shallow bowls, saucers, or water jars. Most of the sherds are less than 2.0 cm square with the smallest one being less than 1.0 cm across and the largest one measuring 4.5 cm in its longest dimension. The thickness ranges from 0.4 to 1.0 cm with the average between 0.6 and 0.7 cm. A single basal sherd appears to be from a

Table 3. Vertical distribution of glazed pottery sherds.

Distribution	0 - 4"	4 - 8"	Total
Test pits	1	0	1
Main excavation	32	10	42
Total	33	10	43

ring-base bowl or saucer, and there are eight simple rim sherds. The glaze varies in color and a yellowish-tan, tan, shades of brown, green and greenish-blue are represented. Some examples show designs in two or three colors with the glaze paint applied rather carelessly in simple patterns. The larger sherds exhibit surface striations which suggest manufacture by the use of a potter's wheel rather than by hand. Similar glazed sherds may be found around present-day houses in the area, and similar wares can be bought in the village markets. The sherds do not have any relationship to the prehistoric occupation of the site, but are included here because they were found in the excavations. Table 3 gives the depth or vertical distribution of the glazed pottery sherds.

All of the glazed pottery sherds were found within the plowed zone of the site and have apparently become mixed with the prehistoric materials as a result of cultivation.

The glazed pottery sherds come from different parts of the site and are not limited to any specific area although occasionally pieces which may be from the same vessel were recovered from adjacent squares. The horizontal distribution, however, does not suggest a concentration in any special section of the site. Examples are presented in Figure 11.

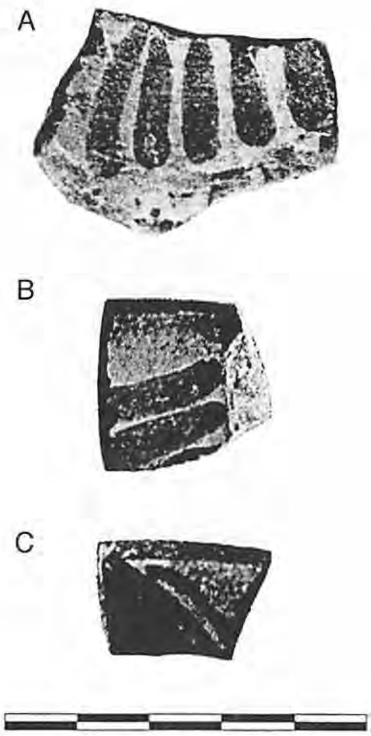


Figure 11. Glazed pottery sherds: (A) #497, from square S2-R1, depth 0 to 4"; (B) #379, from square S11-L5, depth 0 to 4"; (C) #467, from square S17-R2, depth 0 to 4".

Prehistoric Pottery Sherds

There is a total of 1668 pottery sherds which are believed to be mainly prehistoric. It is possible that some of these, however, could be from undecorated utility wares of modern manufacture, but the lack of detailed pottery studies for the area and the small size of the sherds make identification uncertain. This total number includes two decorated sherds and 30 small rim sherds.

The sherds are generally small in size and the total volume would not exceed two liters. The smallest sherds measure under 1.0 cm in diameter, and the largest sherd measures 4.8 cm in its longest dimension. Most of the sherds are 2.0 cm or less in diameter; the thickness ranges from 0.3 to 2.0 cm with the majority being between 0.6 and 0.8 cm.

The colors include various shades of gray, light tan, brown and red. The red or reddish-brown sherds have been painted or covered with a thin slip or wash. The surface finish varies from sherd to sherd, partly as a result of weathering and partly as a result of polishing the surface. Many sherds show smoothing or tool striations on the surface, some are unevenly smoothed, and others are polished. In general, the thicker and larger sherds tend to be less carefully made than the thinner and smaller sherds, perhaps reflecting the function or size of the original vessel.

The vessel shape is not indicated from the available sample, but sherd thickness suggests both large and small containers. The rim sherds are chiefly from simple round-lipped rims although three specimens indicate a slight outward flaring rim, and five specimens have a thickened and flattened lip.

The paste of the sherds feels quite sandy except on the polished surfaces, and it has been tempered with fine sand or volcanic ash. Often the paste is unevenly fired, showing bands of light and dark colors in cross section. There are no clear examples of coil fractures although some

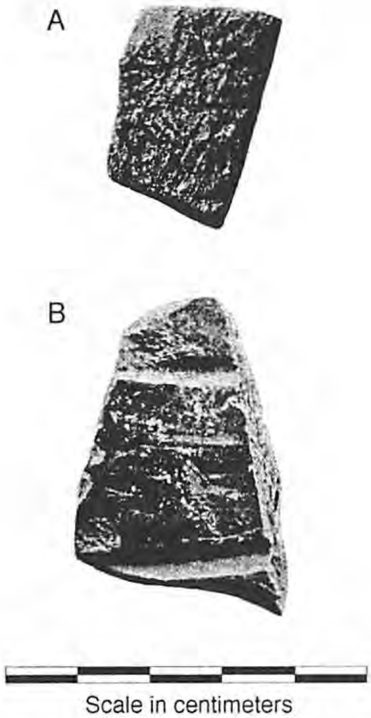


Figure 12. Prehistoric pottery sherds: (A) #39, from square S38-L1, depth 4 to 6"; (B) #251, from square S29-L2, depth 4 to 8".

rectangular sherds are broken in such a manner as to suggest a coiling technique.

Aside from the two decorated sherds, one other requires special mention. It is a small sherd exhibiting about one-third of a biconical perforation. This may be from a suspension hole, from a repair hole for lashing a cracked vessel, or the sherd may be from some unidentified object. The sherd is too small and broken for one to be certain. One decorated sherd is a polished red slipped ware having two trailed lines extending across the surface. The trailing is a shallow rounded groove between 0.3 and 0.4 cm in width and 0.1 cm in depth (Fig. 12). The second decorated sherd has been decorated by several incised lines cut into the surface of the vessel (Fig. 12). No other sherds appear to merit special mention.

The pottery was found in all sections of the site although not all squares produced samples. Out of the total of 193 squares, four squares lacked pottery. The largest number of sherds found in any single square was 32 specimens. The vertical distribution of the pottery sherds is given in Table 4.

The pottery sherds are concentrated in level 1 (0 to 4") although a large number are to be found in level 2 (4 to 8"). This is certainly to be expected because of cultivation and the presence of modern glazed sherds within these levels. Discounting the test pits, there are 34 sherds from level 3 (8 to 12") and one sherd from level 4 (12 to 16"). The deeper sherds from the test pits came from Test Pit 3, which contained an extra mantle of wind blown sand upon its surface so that the various levels are not stratigraphically equivalent to the main area of excavation. In the main area of excavation, with the exception of one sherd, the sherds from level 3 are all from the south section of the excavation in the area where the plowed zone extended to the greatest depth (Fig. 13). In this area the removal of two levels did not always clear the plowed zone, and the upper part of level 3 sometimes contained remnants of this plowed zone. It is believed that sherds found in level 3 represent sherds that are to be associated with this zone at the site. The single sherd from level 4 is too deep for the plowed zone, and its presence at this level is not understood. It is suspected that this sherd is one which was placed in the wrong sack by one of the workmen, possibly having been collected from the surface or from an adjacent square. It came from square S11-L4, which contains no pottery in either levels 2 or 3 and which are located in the northern section of the site. With this single exception, there are no sherds lower than level 2 in this area of the excavation.

The horizontal distribution of the pottery sherds (Fig. 13) indicates a heavier concentration in the southern section of the excavation, especially between S35 and S45. It is also in this area that level 3 sherds are concentrated. The fact that this sector is still under cultivation may be responsible for the greater number of sherds.

Hematite

There are three small pieces of hematite from

Table 4. Vertical distribution of prehistoric pottery sherds

Distribution	0 to 4"	4 to 8"	8 to 12"	12 to 16"	Total
Test Pits	17	6	8	4	35
Main excavation	1161	437	34	1	1633
Total	1178	443	42	5	1668

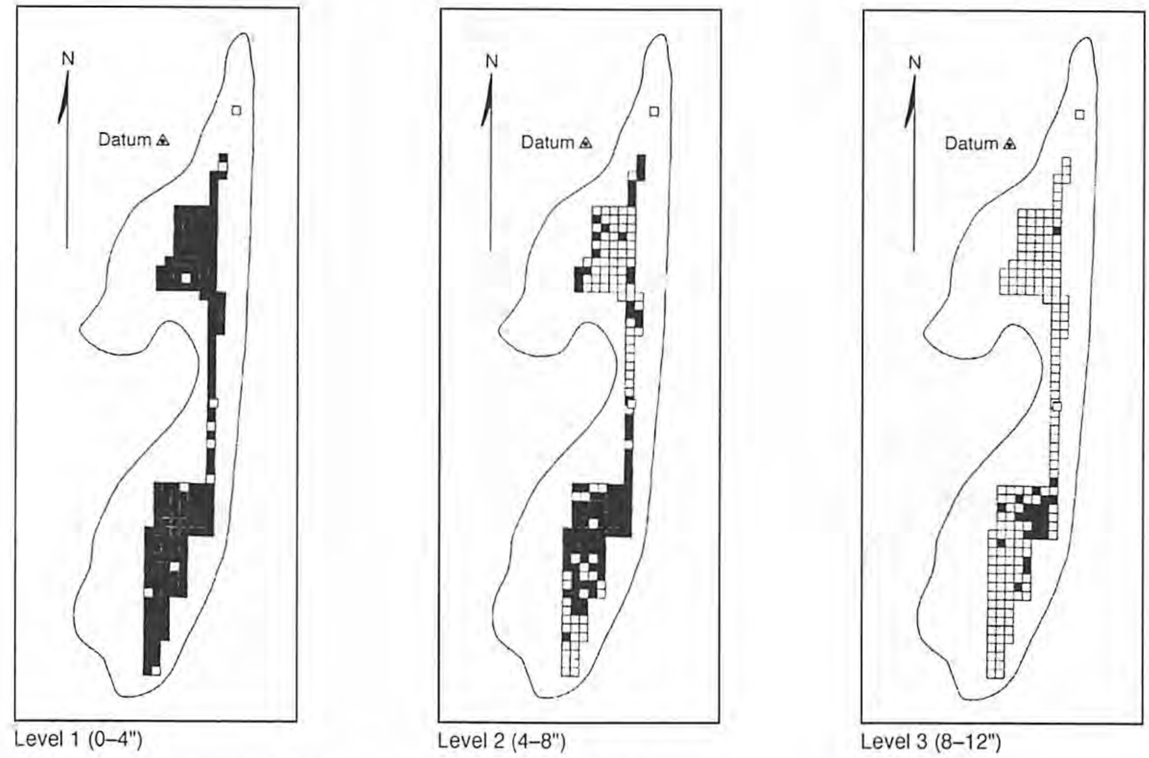


Figure 13. Horizontal distribution of prehistoric pottery sherds.

El Inga. The largest specimen measures 0.9 by 1.4 by 1.9 cm, and the other two pieces are slightly smaller in size. They are not marked by evidence of grinding or striations to indicate their use as raw material for pigment, but each specimen will produce a bright red color when marked upon a streak plate. One specimen came from square S25-Rl at a depth between 4 and 8", and the other two came from square S13-L4 at a depth between 12 and 16". Although they exhibit no evidence of use, the material was certainly carried to the site by the early inhabitants. Although rare and of questionable use, it is believed that the hematite should be included in the cultural inventory of the El Inga complex.

Striated Stone

One small stone measuring 7.1 by 4.2 by 3.5 cm has a number of shallow striations or grooves cut into the surface, apparently from use as an abrader. The specimen was found in Stratigraphic Block #3 at a depth of 8 to 10" below the surface. At first it was thought that the grooved appearance might have resulted from differential weathering, but this is not the case as the striations cut across contained crystals and matrix of the pebble which is apparently volcanic in origin. This would not weather in the manner indicated but has been altered by use as a tool by the inhabitants of the site. The grooves vary slightly in width as well as depth and appear to have been produced by rubbing against a sharp edge of hard material (Fig. 14). Possibly this stone was used to grind the stem edges on projectile points or other artifacts found at the site.

Figure 14. #212, grooved or striated stone, from square S11-L1, depth 8 to 10".

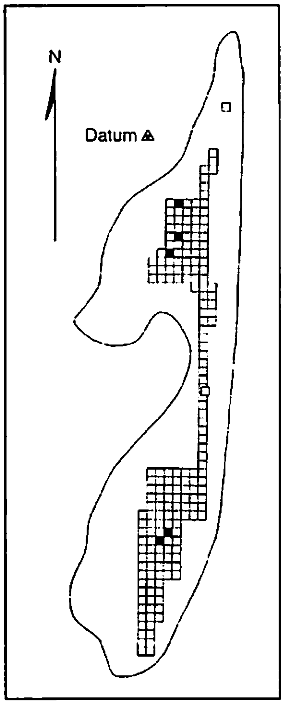


Figure 15. Distribution of chip caches by square.

Chip Caches

There are six chip caches from the excavation. These are represented by clusters of chips and flakes that were found within a limited area of the site, usually less than 12" in diameter. It is not clear whether these deposits of chips were intentional caches of chips placed in these spots by the inhabitants, or if they merely were an accidental result from artifact manufacture. The surrounding soil gave no indication of the cache having resulted from debris collecting in an animal burrow or within a pocket of an irregular surface where it became trapped by an erosional process.

Many of the flakes could serve as knives or as raw material for the manufacture of smaller artifacts; other chips are so small as to appear worthless even though the obsidian had obviously been transported to the site. Thus, the importance of these chip caches to the inhabitants remains unsettled and uncertain.

Five of the chip caches came from the main area of excavation (Fig. 15), and one was found in Test Pit 2A. Three caches came from the northern sector of the main grid, and two came from the southern section. Three of them came from level 4 (12 to 16") which is also a zone of abundant chip debris.

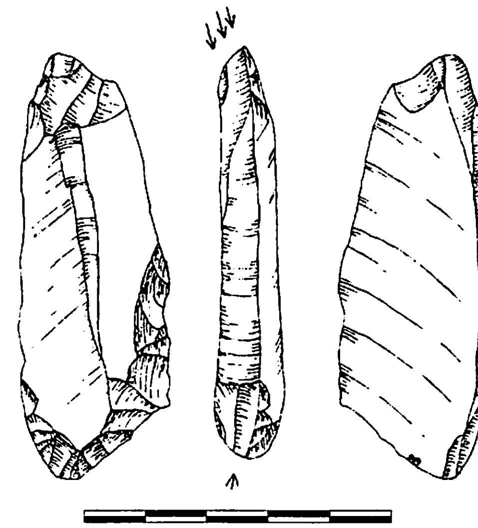


Figure 16. Cache #864: three views of a scraper showing burin facets.

Chip Cache #864

One chip cache containing 65 obsidian chips was found in square S4-L2 in the second level (4 to 8"). It appeared as a lens of chips about 6" in diameter in the northeast quarter of the square. The cache contains 64 chips of obsidian and one artifact. The chips range in size from less than 1.0 cm to a maximum length of 4.7 cm. The single artifact (Fig. 16) appears to be a scraper that has been modified by conversion to a burin at one end.

Chip Cache #865

This cache, containing 301 obsidian chips and three fragments of artifacts, was found in square S10-L3 in level 2 (4 to 8"). The chips were concentrated within the center portion of the southwest quarter of the level. The obsidian chips range in size from 0.5 to 4.9 cm, but many of them are less than 1.0 cm in size, and it is difficult to believe that they would have been of much value to the owner as raw material.

The three artifacts are illustrated in Figure 17. One is a small flake that has been used as a scraper along one edge, and the other two are fragments of larger scrapers exhibiting more careful preparation and shaping.

Chip Cache #856

A chip cache containing 60 obsidian flakes was found in square S44-L4 at a depth of 14" in the approximate center of the square. The cache contains 59 obsidian chips ranging in size from

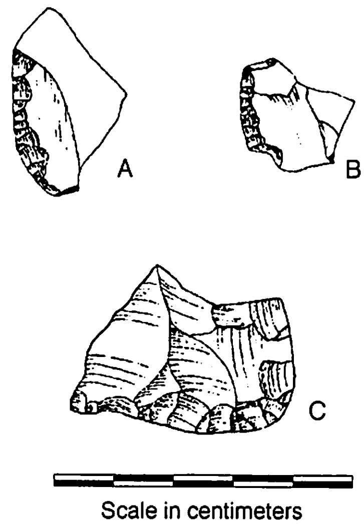


Figure 17. Cache #865: (A and B) fragments of flake scrapers; (C) fragment of a thick well-made scraper.

0.6 to 7.5 cm in length. One obsidian flake shows evidence of having been used as a knife or scraping tool along one edge (Fig. 18). A number of the other flakes would serve equally well as knives but exhibit no secondary chipping.

Chip Cache #863

An obsidian chip cache was found in the southwest quarter of square S8-L2 at a depth of 14" below the surface. The cache includes 216 obsidian flakes ranging in size from 0.9 to 4.4 cm. There are four pieces which represent broken artifacts; all are scrapers showing secondary flaking along one edge (Fig. 19).

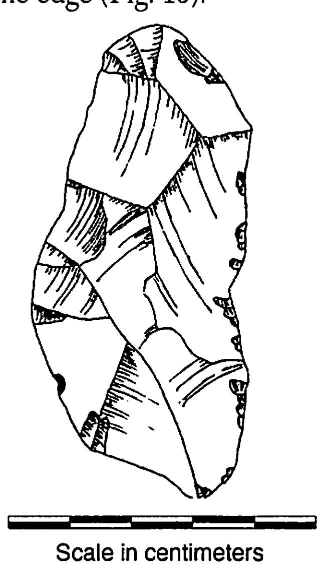


Figure 18. Cache #856: flake showing evidence of use as a knife or scraper.

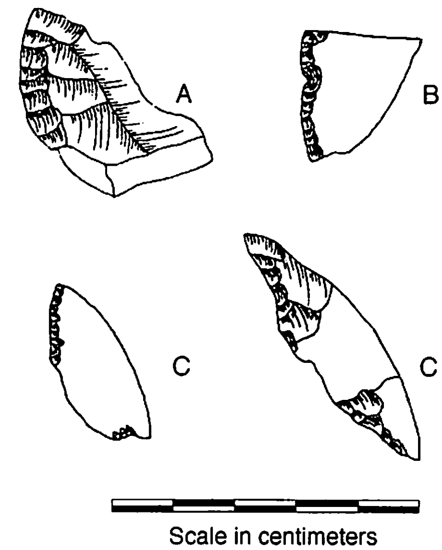


Figure 19. Cache #863: (A and D) fragments of thick scrapers; (B and C) fragments of flake scrapers.

Chip Cache #679

A small obsidian chip cache was found in the northwest quarter of square S43-L3 at a depth of 14". It contains a total of 38 pieces, 1 artifact, and 37 flakes. The flakes range in size from 0.6 to 4.5 cm. There is one secondary burin spall which shows evidence of having been used as a scraper at one end (Fig. 20).

Chip Cache #505

One chip cache was found in Test Pit 2A in level 3 (8 to 12"). It contains 271 items, including 9 artifacts and 262 chips. There are two chips of basalt, but all the rest are of obsidian ranging from 0.8 to 5.3 cm in maximum length.

The artifacts include 2 primary burin spalls, 1 secondary burin spall, 4 flakes with retouched

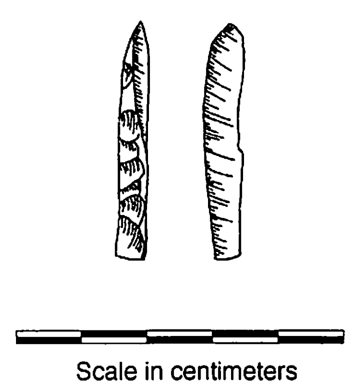


Figure 20. Cache #679: two views of a burin spall.

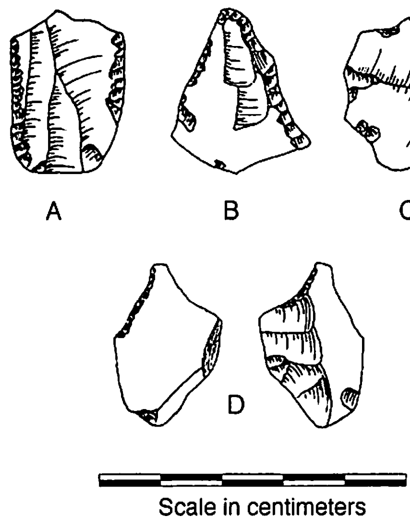


Figure 21. Cache #505: (A and B) fragments of flake scrapers; (C) possible pointed graver or perforator; (D) two views of a chisel-graver or reamer.

edges suggesting scrapers, and 2 unidentified objects. Of these last two, one specimen has retouching along the sides to produce a small projection which would serve as an engraving tool; the other has a projecting "screwdriver"-like tip which could serve as a graver or reamer type implement (Fig. 21).

Projectile Points

Projectile points are represented by a small number of complete specimens and a number of broken fragments. The total of objects classed as projectile points or fragments from projectile points numbers 122 specimens. It must be admitted that some of these, especially fragments, could represent knives rather than projectile points.

Of the total number, 74 specimens are fragments which cannot be identified with any specific form or recognizable style because distinctive parts are missing. The remaining 48 specimens are more complete or have characteristics which help in their identification. Of this latter group, 21 specimens are very much alike and appear to represent a distinctive type, the Fell's Cave Fish-tail point; the remaining 27 specimens include several forms which probably represent additional different types. The total sample is so small, however, that the limits of variation are not detectable, and consequently all of the specimens are illustrated.

Table 5 shows the distribution of the various points according to depth at the site. Each specimen is indicated by the catalog number which is also identified in the illustrations.

Fell's Cave Fish-tail Points

A stemmed projectile point resembling those found by Bird (1946) at Fell's Cave is the most typical type found at El Inga. There are 21 examples of this type that can be identified, chiefly from the distinctive base, and, of these, only two are complete specimens. All of them are illustrated in Figures 22 and 23. In most cases the rectangular concave based stems are fluted or basally thinned by smaller flakes, and the edges of the stem have been ground smooth. Some of the specimens appear to have been made from thin flakes which permitted a minimum amount of chipping to shape the point.

In horizontal distribution, this type is most abundant in the northern section of the excavation, only three examples having been found in the southern section (Fig. 24). The distribution according to depth from the surface is shown in the preceding table. The maximum number of four occurs in level 4 (12 to 16") although specimens were found in all levels of the excavation.

Other Projectile Points

Of the remaining 27 projectile points there are some which appear to represent the same type while other forms are represented by single examples. There are seven specimens which are included as a stemmed form in which the stem tapers toward the base (Fig. 26A–G). The stem is relatively narrow with a rounded base, and the shoulders are prominent. Only three specimens are clearly represented, but there are four stems (Fig. 26D–G) which are believed to be broken from this type. In two of these broken stems, the

Table 5. Vertical distribution of El Inga projectile points (specimens indicated by catalog numbers). ° Indicates surface find.

Depth	Fell's Cave Fish-tail	Contracting stem	Broad-stem	Ovate	Barbed	Unique
0 to 4"	#9°, #92a, #92b, #302		#15		#45, #247	
4 to 8"	#5, #309, #682a, #682b	#356	#4, #334	#86		
8 to 12"	#3, #10, #58a, #58b	#120, #143, #609, #825	#7, #95, #152, #399	#11, #298		#227
12 to 16"	#44a, #71, #91, #354	#74, #113	#44b, #154	#155	#12	#124
16 to 20"	#18, #17, #118		#337	#60		
20 to 24"	#14, #122					

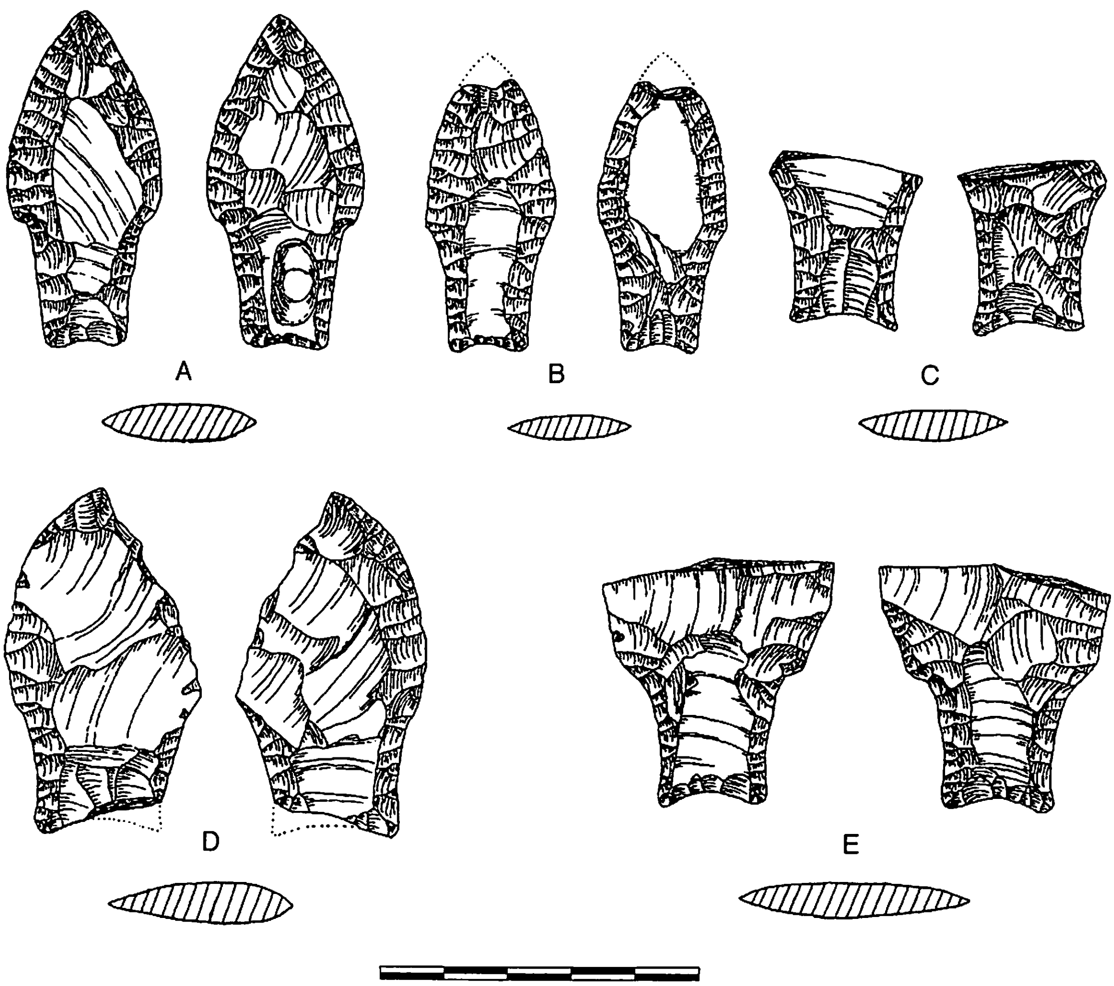


Figure 22. Fell's Cave Fish-tail points: (A) #14, dark brown flint or chert, thermal flake scar on stem, from square S12-L1, depth 20 to 22"; (B) #3, obsidian, fluted on one face, made from thin flake, point tip damaged at time of discovery, ground stem edges, from square S39-R1, depth 8 to 12"; (C) #92a, obsidian, basal thinning, made from flake, ground stem edges, from square S22-R1, depth 0 to 4"; (D) #71, obsidian, fluted on one face, blade appears to have been reworked, ground stem edges, from square S12-L1, depth 16"; (E) #5, obsidian, fluted on both faces, ground stem edges, from square S12-L3, depth 8".

sides are parallel, but these are believed to be broken from points of this general stemmed form.

This contracting stemmed type was found in both sections of the site, four being found in the northern section of the excavation, and three being found in the southern section (Fig. 25). In terms of depth, they all came from between 4 and 16" with four specimens appearing in level 3 (8 to 12").

There are 10 specimens which differ from those mentioned above and are tentatively grouped under the term broad-stemmed points. All of these are illustrated in Figure 27A–J, and it is believed that Figures 27A and E can be considered as typical examples. It is also possible that these latter two specimens are merely variants of the Fell's Cave Fish-tail type. The remaining forms exhibit considerable variation or have been modified by reworking in some manner. The distribution of these broad-stemmed points by square is shown in Figure 28. Seven examples were found in the northern section of the excavation, and three were found in the southern section. The vertical distribution is shown in Table 5. The maximum number of four specimens came from a depth between 8 and 12".

There are five ovate or leaf-shaped projectile points (Fig. 31A–E). Although these are consid-

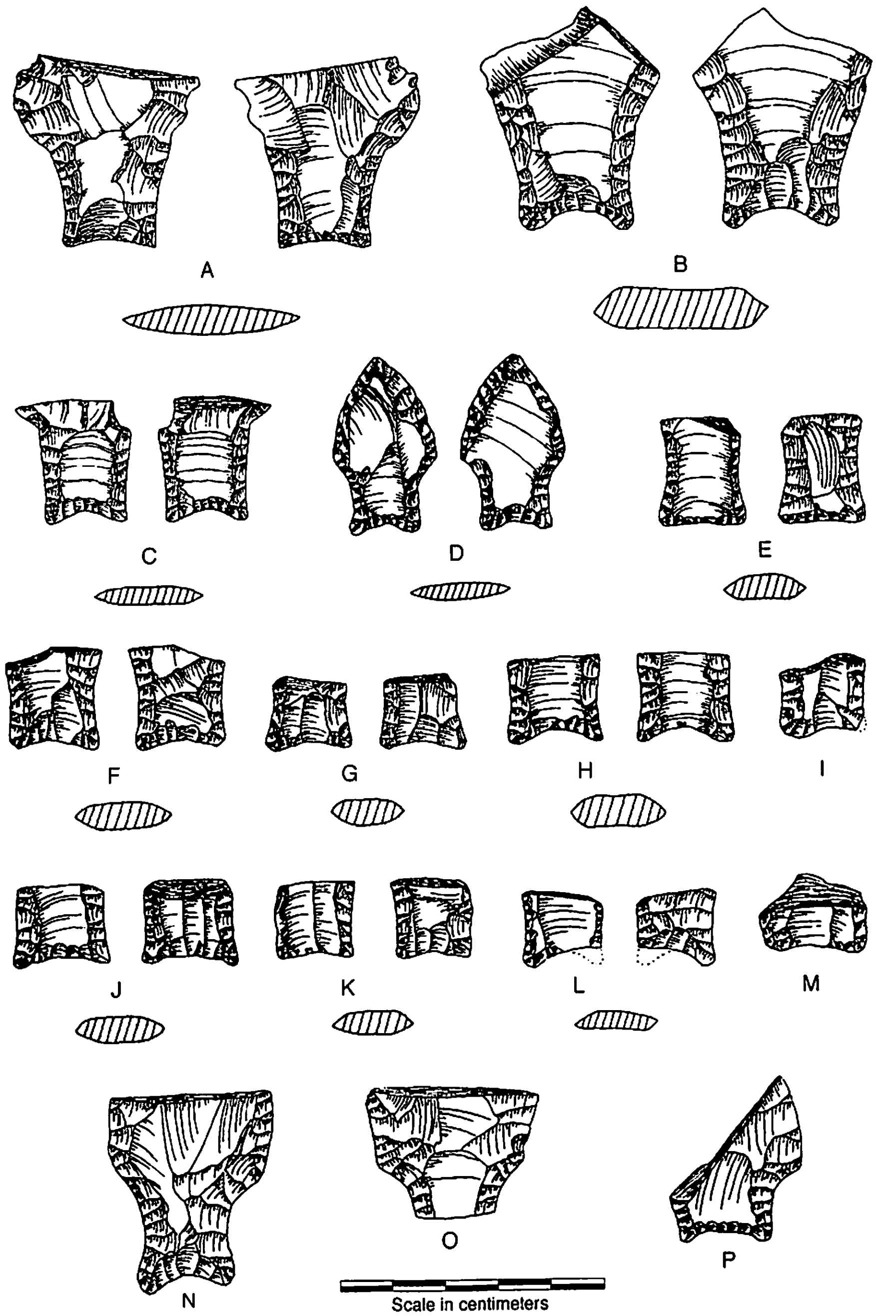


Figure 23. Fell's Cave Fish-tail points: (A) #58a, obsidian, fluted on one face, ground stem edges, from square S13-R1, depth 8 to 12"; (B) #17, obsidian, fluted on both faces, ground stem edges, from square S11-L2, depth 17"; (C) #9, obsidian, fluted on both faces, ground stem edges, found on the surface; (D) #18, obsidian, made from flake, from square S11-L0, depth 18"; (E) #91, obsidian, fluted on one side, ground stem edges, from square S4-R1, depth 12 to 16"; (F) #122, obsidian, basal thinning, ground stem edges, from square S12-L2, depth 23.5"; (G) #682a, obsidian, basal thinning, slightly ground stem edges, from square S4-L3, depth 4 to 8"; (H) #92b, obsidian, fluted on both faces, ground stem edges, from square S22-R1, depth 0 to 4"; (I) #682b, obsidian, basal thinning, ground stem edges, from square S4-L3, depth 4 to 8"; (J) #354, obsidian, fluted on one face, ground stem edges, from square S8-L0, depth 12 to 16"; (K) #309, obsidian, basal thinning, ground stem edges, from square S15-R1, depth 4 to 8"; (L) #302, obsidian, fluted on one face, slightly ground stem edge, from square S20-R1, depth 0 to 4"; (M) #44a, obsidian basal thinning, slightly ground stem edges, from square S38-L1, depth 12 to 14"; (N) #10, obsidian, Fell's Cave variant, ground stem edges, from square S12-R1, depth 8 to 12"; (O) #118, obsidian, base has been broken off, made from flake, ground stem edges, from square S11-L0, depth 16 to 20"; (P) #58b, obsidian, reworked, base has been broken off and reworked, ground stem edges, from square S13-R1, depth 8 to 12".

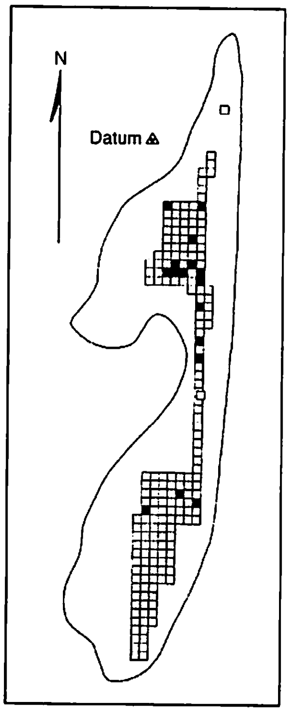


Figure 24. Distribution of Fell's Cave Fish-tail points by square.

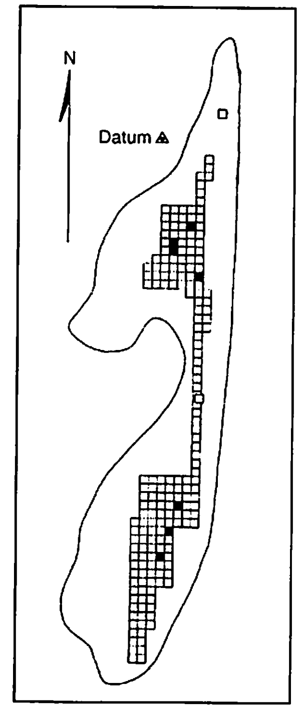


Figure 25. Distribution of contracting stemmed points by square.

ered as projectile points, they could have served equally well as knives. Three specimens are medium in size and appear to have a distinctive basal portion which is roughly triangular in outline. One specimen is considerably larger than the other four and perhaps should be differentiated because of its larger size. It is, however, the only example of this large size with the possible exception of some fragments. One of the five specimens is quite small and has more rounded

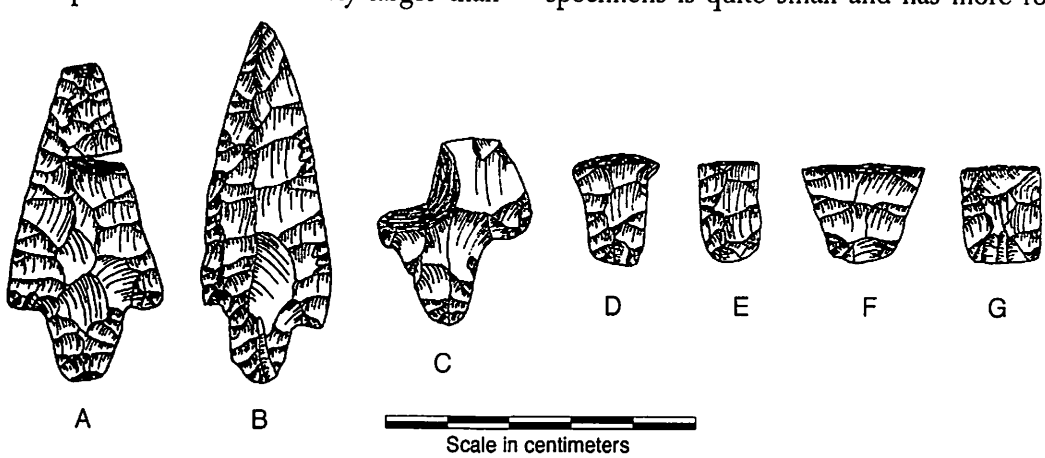


Figure 26. Contracting stemmed points: (A) #703 and #113, broken when found but matched together in the laboratory, obsidian, no grinding (#703 [tip], from square S46-L3, depth 12 to 16"; #113 [basal section], from square S45-L3, depth 14"); (B) #120, obsidian, no grinding, from square S8-L2, depth 10"; (C) #825, obsidian, no grinding, broken in excavation, made from flake, from square S9-L2, depth 8 to 12"; (D) #356, obsidian, probably stem from stemmed point similar to items A to C, no grinding, from square S12-R1, depth 4 to 8"; (E) #143, obsidian, probably stem from stemmed point similar to items A to C, slight grinding, from square S6-L0, depth 10 to 12"; (F) #609, obsidian, probably stem from stemmed point similar to items A to C, ground stem edges, from square S39-L1, depth 8 to 12"; (G) #74, obsidian, possibly stem from stemmed point similar to items A to C, ground stem edges, from square S42-L2, depth 15".

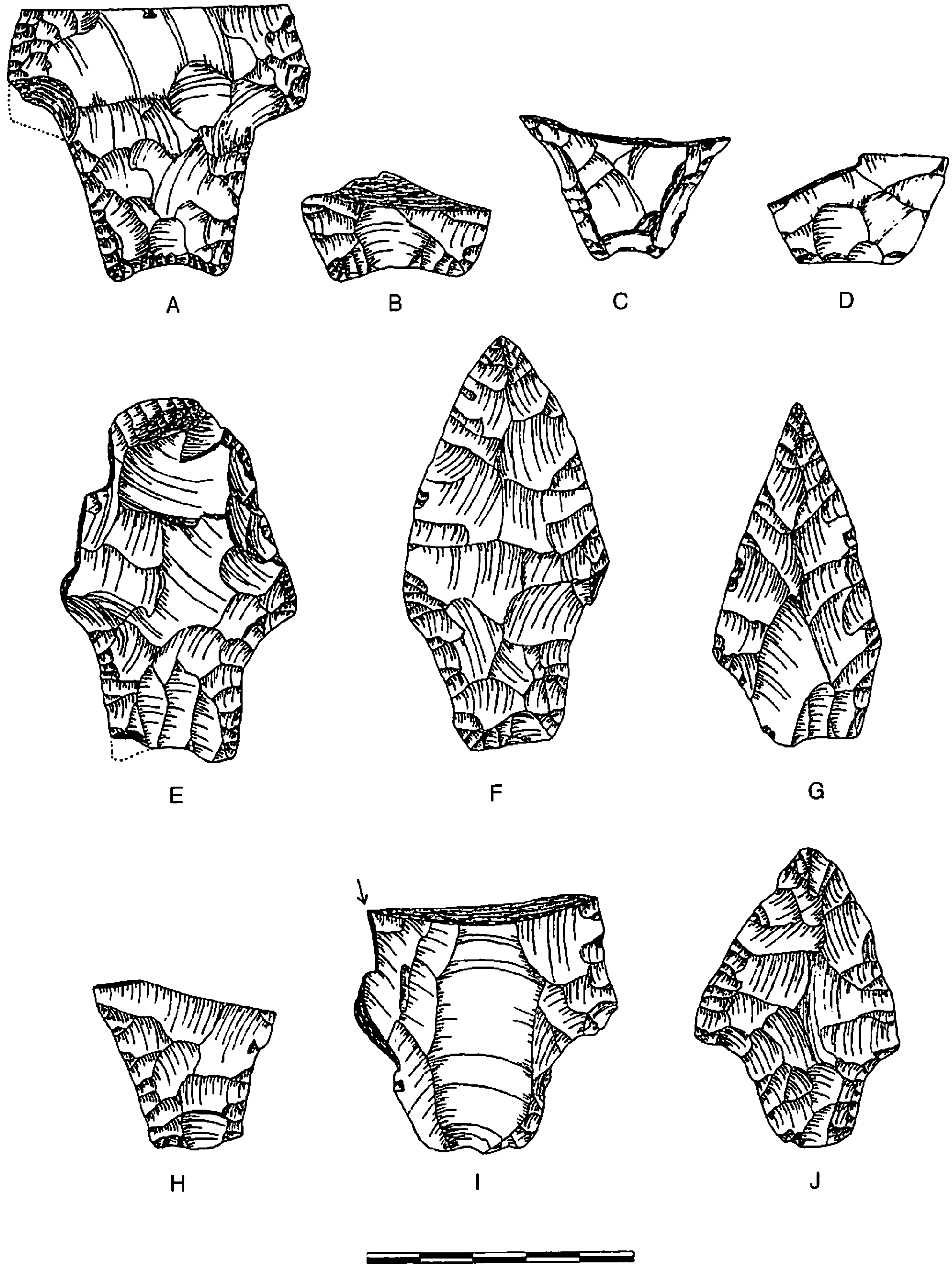


Figure 27. Broad-stemmed points: (A) #95, obsidian, ground stem edges, from square S7-L1, depth 12"; (B) #399, obsidian, stem base from type shown in A, ground stem edges, from square S9-L0, depth 8 to 12"; (C) #44b, basalt, thick and somewhat crude, from square S38-L1, depth 12 to 14"; (D) #334, basalt, possibly from broad-stemmed form or lanceolate type, ground stem edges and base, from square S9-L1, depth 4 to 8"; (E) #154, obsidian, tip and blade damaged apparently from impact fracture, ground stem edges, from square S40-L5, depth 12 to 16"; (F) #15, obsidian, slightly ground stem edges, from square S11-L3, depth 2"; (G) #4, obsidian, thinness of tip and symmetrical form suggest that this specimen may have been reworked from larger specimen, slightly ground stem edges, from square S10-L2, depth 6"; (H) #337, obsidian, base appears to be reworked, this specimen may be from the Fell's Cave Fish-tail type in which original base has been broken off, from square S9-L1, depth 16 to 20"; (I) #7, obsidian, burin blow on a break, from square S41-L0, depth 8 to 12"; (J) #152, obsidian, thinness of stem suggests that this may have been made from a broken point which was reshaped to produce stem, from square S7-L0, depth 10".

basal section, perhaps indicating another variation in type. Four of the ovate specimens came from the southern section of the excavation while only one was found toward the north end (Fig. 30). This distribution is unlike that of the other projectile points and may be of cultural significance. The distribution according to depth (Table 5), however, does not show concentration in any particular zone.

Finally, there are three specimens, all broken, that are from projectile points having a barbed shoulder. The stems are all broken, and the complete outlines remain unknown (Fig. 32). Possibly they are examples of the contracting stemmed forms mentioned earlier. They are from various parts of the site (Fig. 33), with two specimens representing level 1 (0" to 4") (Table 5).

Projectile-point Fragments

There is a total of 74 specimens which are classed as fragments from projectile points. Selected examples are illustrated in Figures 35 and 36. It is quite possible that some of these specimens are broken from knives which have been flaked on both surfaces. These specimens are represented chiefly by points, midsections, or fragments including a shoulder area; they also have somewhat better workmanship than items classed as knife fragments.

Three specimens are made of basalt while the remaining 71 pieces are made of obsidian. The horizontal distribution of projectile point fragments throughout the excavated area is shown in Figure 34. The distribution according to depth is shown in Table 6.

Knives

There is a total of 276 items classed as knives from the El Inga excavations. These include three varieties represented as follows: one hafted knife, 145 bifacially flaked knives, and 130 flake knives. Their distribution according to depth is shown in Table 7.

Table 6. Vertical distribution of projectile-point fragments

Depth in inches	Point fragments
0 to 4	10
4 to 8	16
8 to 12	16
12 to 16	20
16 to 20	8
20 to 24	4
Total	74

Table 7. Vertical distribution of knives.

Depth in inches	Hafted stem	Bifacial	Flake
0 to 4	0	19	7
4 to 8	0	20	24
8 to 12	0	37	45
12 to 16	1	33	51
16 to 20	0	31	2
20 to 24	0	5	1
Total	1	145	130

A single specimen made from a thin obsidian flake has a stem for hafting (Fig. 37). This is especially interesting as the stem is similar in form to the Fell's Cave Fish-tail projectile points. It is not clear as to whether the specimen is damaged and incomplete, or whether the stem was chipped at one end of an irregular flake. The possibility that this specimen might represent an unfinished projectile point has been considered but was rejected. The thinness of the flake and slight retouching along the cutting edge suggest a hafted knife.

There are 145 specimens classed as knives which exhibit chipping upon both faces of the artifact. Only seven specimens are complete (Fig. 38) with the vast majority of examples being represented by fragments. Examples of broken specimens are illustrated in Figures 39 and 40.

All of the bifacially flaked knives are made of obsidian, and the workmanship is not generally as good as that present on the projectile points. The knives are roughly ovate in outline and are often irregular or asymmetrical perhaps reflecting the form of the obsidian flake from which the specimen was made. Some fragments (Fig. 39 I and L) indicate that considerable variation in the knife forms exist, but unbroken specimens are not available.

The bifacial knives are found in all sections of the site and in all levels of the excavation. The horizontal distribution by levels is shown in Figure 41.

There are 130 specimens classed as flake knives or blade-like knives. These are represented by relatively thin and narrow flakes which could serve as a useful cutting tool. Examples of flake knives are illustrated in Figures 42 and 43. It is quite possible, of course, that some objects classed as flake knives represent merely chipping debris or that flakes included with obsidian debris were actually used for knives. Items classed as flake knives are thin, generally relatively long and narrow approaching a blade-like form.

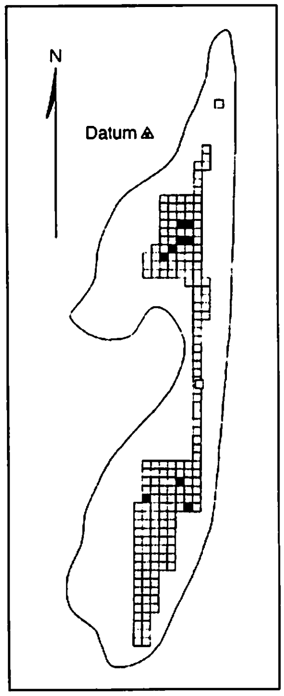


Figure 28. Distribution of broad-stemmed points by squares.

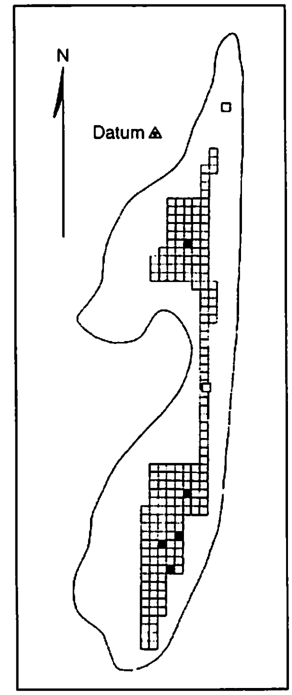


Figure 30. Distribution of ovate or leaf-shaped points by squares.

Some of these specimens would be termed blades by other archaeologists, but I am reserving the term blade for a more restricted category of artifacts. Unfortunately, the term blade is not carefully used and has been applied to a wide variety of objects including relatively narrow flakes, parallel sided flakes, lamellar flakes, and even bifacially chipped items such as knives or harpoon sideblades. I would prefer to reserve the term blade for relatively thin, long and narrow flakes that have been intentionally produced from a specially prepared core. In this case the blades are flat on one face and faceted on the other, with all flake scars having their point of origin at one end of the blade. The manufacture of such blades, upon removal from the core, leaves a faceted or polyhedral core showing the surfaces from which the blades were removed. Examples of such blades together with their faceted cores are to be found in the Hopewell assemblage of the Ohio Valley and in the various cultures of the Valley of Mexico.

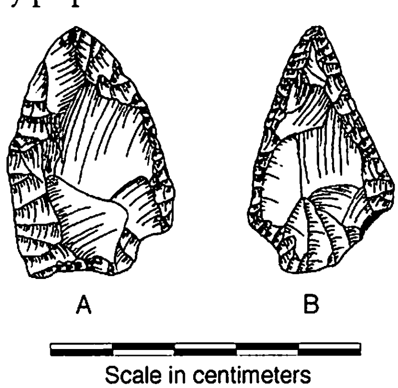


Figure 29. Unique points: (A) #124, obsidian, possibly reworked, unique, from square S12-L1, depth 15.5"; (B) #227, obsidian, shoulder and base damaged, unique, from square S11-L2, depth 10 to 12".

The specimens found at El Inga do not appear to meet the above requirements for blades and are not like those from the Ohio Valley or the Valley of Mexico. They appear to be random blade-like flakes that were accidentally produced by a less specialized chipping process. The general absence of faceted cores and the small number of blade-like flakes within the large sample of chip debris support this conclusion.

The inhabitants of El Inga, however, were not ignorant of the techniques necessary to produce blades. The removal of the flute at the base of the Fell's Cave Fish-tail projectile point or the removal of a secondary burin spall requires this ability. The production of blades as an end product, however, does not appear to be one of their characteristics.

The flake knives or blade-like knives from El

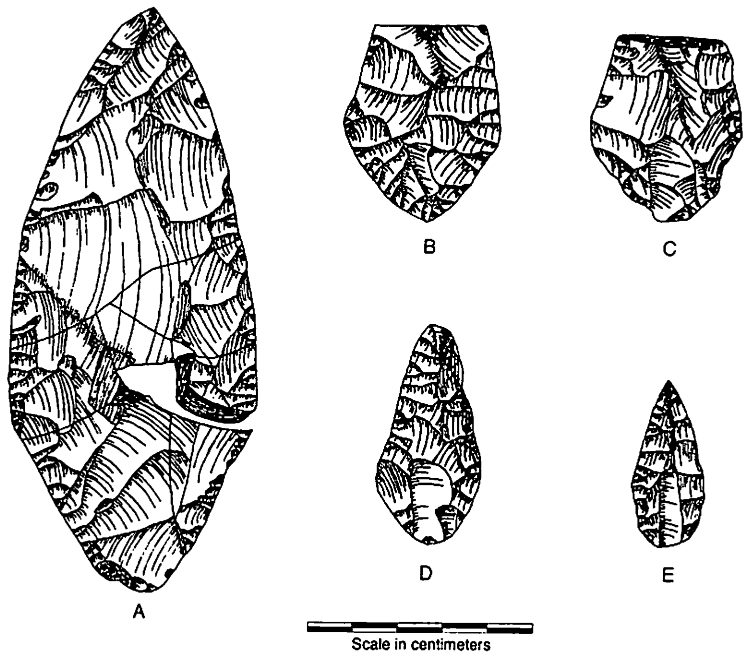


Figure 31. Ovate or leaf-shaped projectile points: (A) #86, obsidian, broken in seven pieces in the field, from square S9-L1, depth 6"; (B) #11, obsidian, from square S48-L3, depth 12"; (C) #298, obsidian, from square S44-L2, depth 8 to 12"; (D) #155, obsidian, slight twist to the blade, from square S45-L4, depth 12 to 16"; (E) #60, basalt, from square S39-L1, depth 16 to 20".

Inga occur in all parts of the site and within the various levels. Their horizontal distribution according to the various levels is shown in Figure 44. All specimens are flaked of obsidian except for two examples, one of flint and one of basalt.

Scrapers

Scrapers represent one of the most common artifacts found at the El Inga excavations. There is a total of 849 specimens that have been classified as scrapers; of these, 815 are made of obsidian, 24 are of basalt, and 10 are of flint. This number includes not only complete specimens, but fragments or broken pieces.

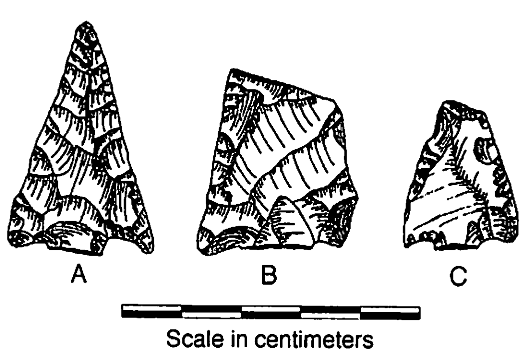


Figure 32. Barbed shouldered points: (A) #12, obsidian, made from thin flake, stem broken off, from square S52-L6, depth 12 to 16"; (B) #45, obsidian, stem broken off, from square S4-L0, depth 0 to 4"; (C) #247, obsidian, made from flake, stem broken off, from square S14-R1, depth 0 to 4".

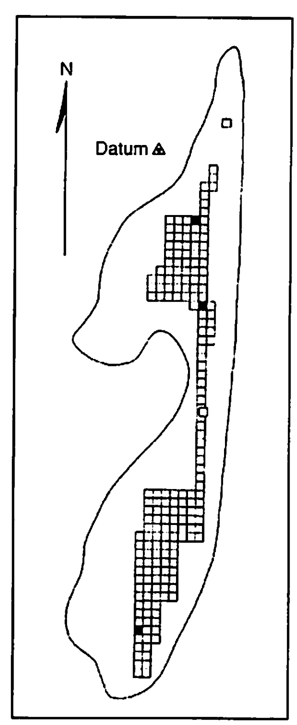


Figure 33. Distribution of barbed points by squares.

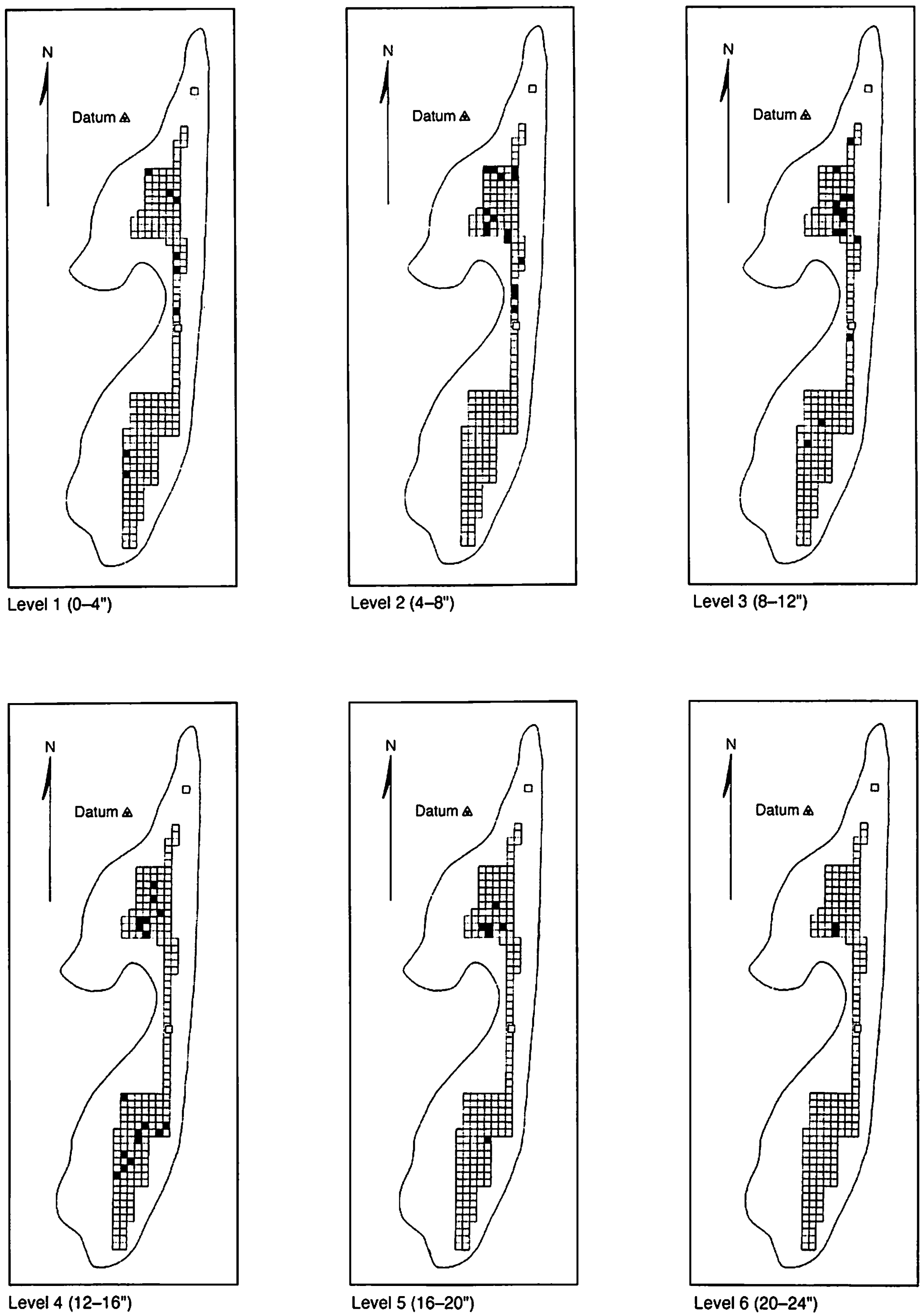


Figure 34. Distribution of projectile fragments by level.

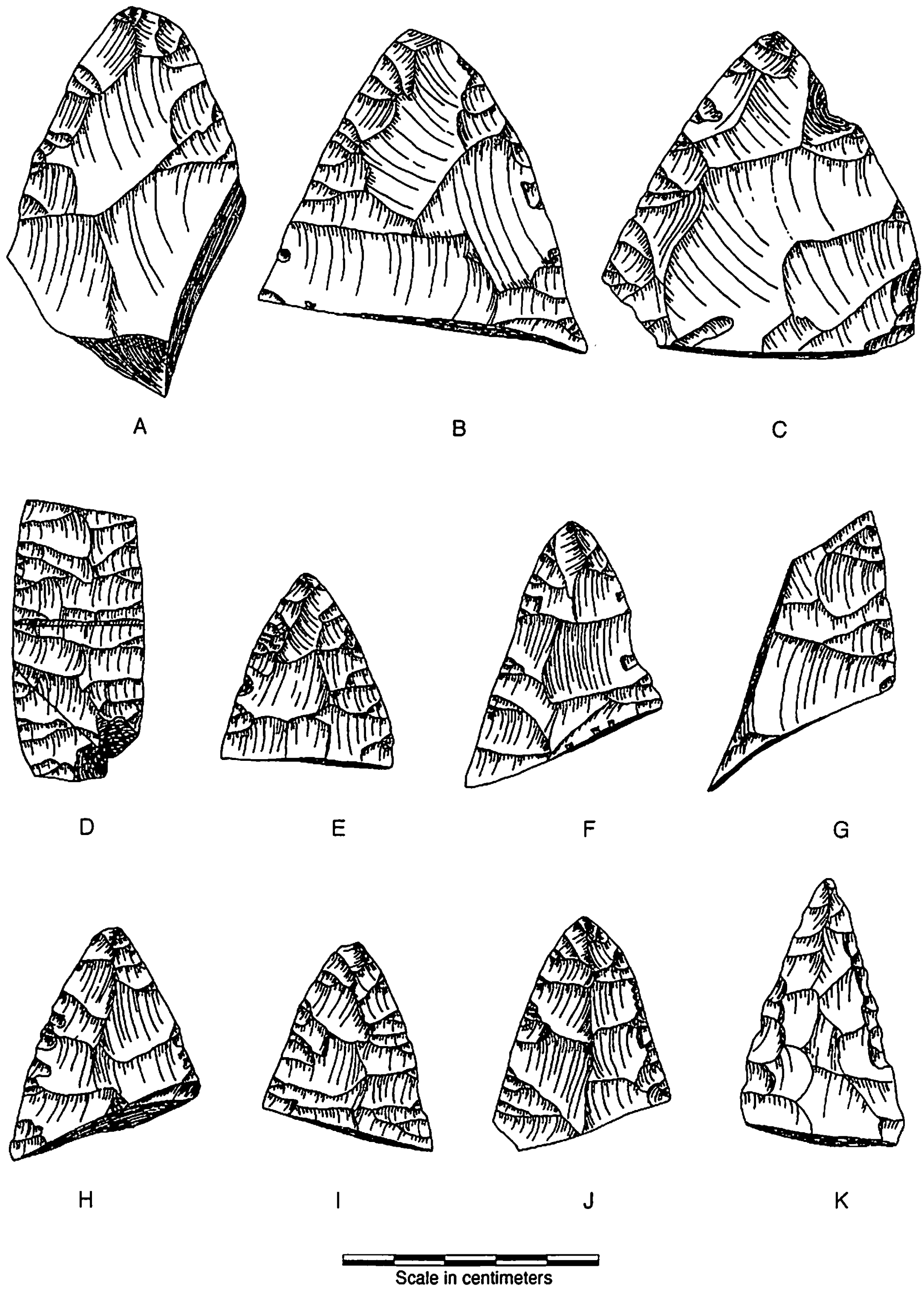


Figure 35. Projectile-point fragments: (A) #128, obsidian, point from large spear, from square S5-L1, depth 7"; (B) #68, obsidian, point from large spear, from square S10-L1, depth 10"; (C) #90, obsidian, point from large spear, from square S10-L1, depth 11"; (D) #176 (top section), #639 (lower section), obsidian, broken in three pieces, stem and point broken off (#176, from square S12-L2, depth 19"; #639 [broken in field], from square S12-L3, depth 12 to 16"); (E) #64, obsidian, from square S10-L0, depth 12 to 16"; (F) #65, obsidian, from square S13-L1, depth 12"; (G) #368, obsidian, section from large spear, from square S14-L0, depth 4 to 8"; (H) #75, obsidian, from square S40-L2, depth 12 to 16"; (I) #77, obsidian, from square S13-L2, depth 14"; (J) #192, obsidian, from square S10-L3, depth 1.5"; (K) #46, basalt, from square S4-L1, depth 8 to 12".

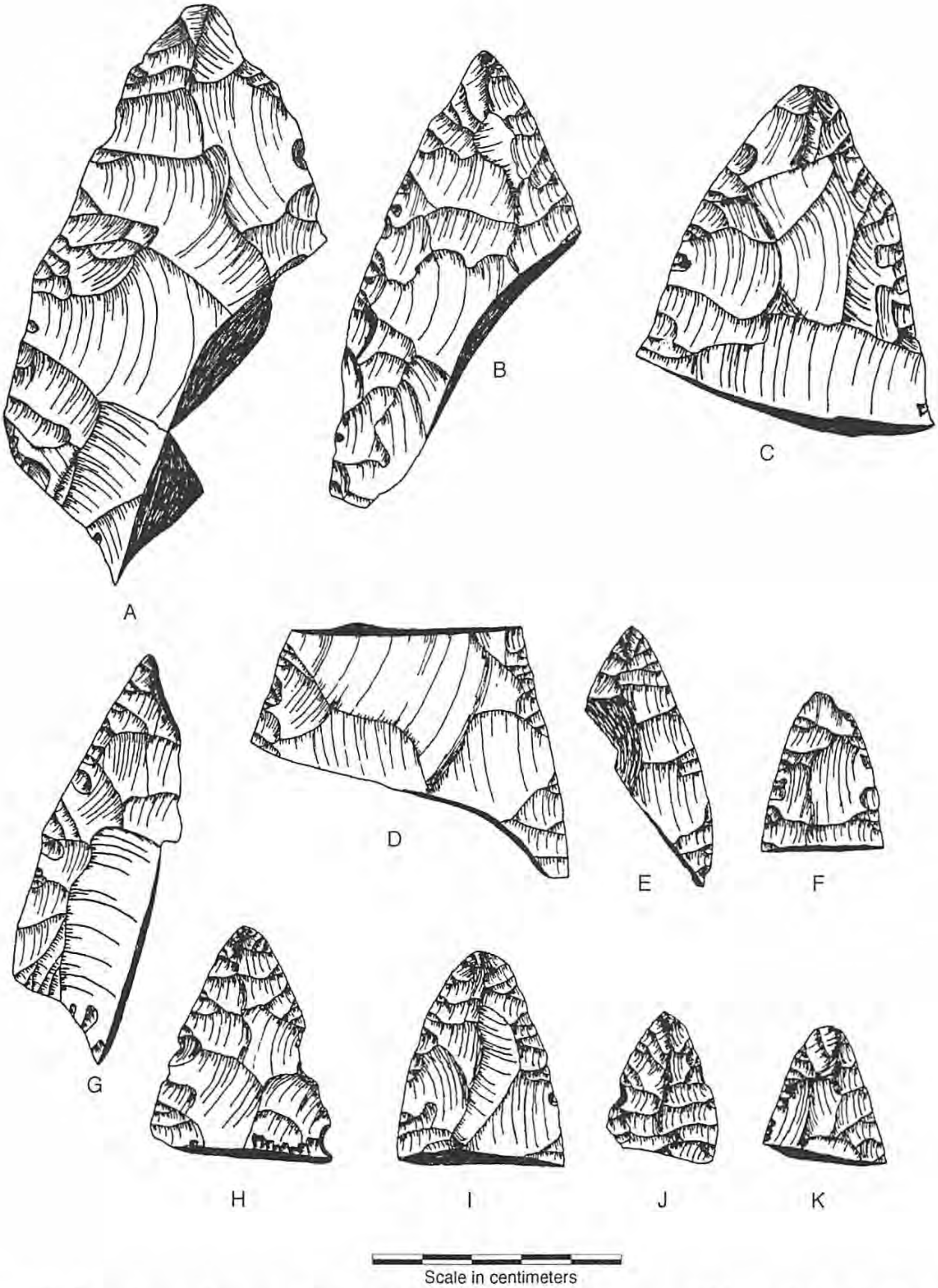


Figure 36. Projectile-point fragments: (A) #13, obsidian, thick and crude, from square S42-L2, depth 16"; (B) #52, obsidian, from square S4-L2, depth 4 to 8"; (C) #196, obsidian, from square S47-L6, depth 13"; (D) #59, obsidian, midsection, from square S10-L0, depth 11"; (E) #740, obsidian, from square S45-L4, depth 12 to 16"; (F) #442, obsidian, from square S14-R2, depth 8 to 12"; (G) #190, obsidian, from square S10-L3, depth 5"; (H) #88, obsidian, from square S44-L6, depth 3"; (I) #408, obsidian, from square S11-L3, depth 12 to 16"; (J) #48, obsidian, from square S4-L3, depth 4 to 8"; (K) #869, obsidian, from square S13-L3, depth 4 to 8".

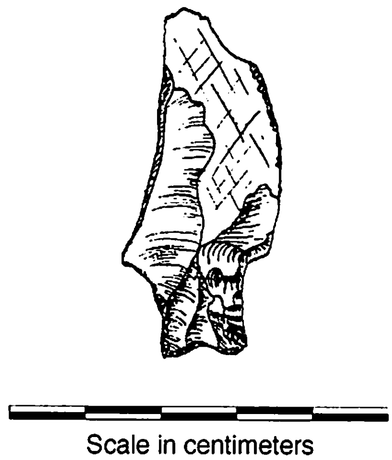


Figure 37. #612: Hafted stem knife, Fell's Cave Fish-tail type stem, made from thin flake, from square S39-L1, depth 12 to 16".

The scrapers have presented considerable difficulty in classification because of the variation of form, size, thickness, and the amount of secondary flaking. Consequently, rather than to present a lengthy series of scraper types, many represented by unique specimens, they have been grouped into four broad categories. These include flake scrapers, concave flake scrapers, blade-like scrapers, and plano-convex scrapers. Since there are differences in their distribution at the site according to whether they are of obsidian or basalt, the plano-convex scrapers are subdivided into two groups according to the material.

In considering all of the scrapers from El Inga, they tend to fall into two major groupings. One category contains those made from a flake or spall of material in which retouching is present along one or two edges. These would include the flake scrapers, concave flake scrapers, and the blade-like scrapers which are merely relatively long and narrow flakes. The second category of scrapers is also made from flakes, but these are thicker, better formed, and with considerably more secondary flaking to shape the artifact. These are generally flat on one face and convex on the other face where the trimming has taken place. Moreover, the plano-convex scrapers usually have a thick, snub-nosed scraping edge at one end.

Flake Scrapers

There are 612 items classed as flake scrapers from the excavations. These are represented by flakes in which trimming flakes have been removed along one or more edges, usually taken from only one face of the artifact. Examples of flake scrapers are illustrated in Figures 45, 46 and 47.

They are represented by irregular flakes without consistency in form, and many appear to have been broken. Many of these specimens have resulted from using an obsidian flake for a scraper; in others, the scraping edges were delib-

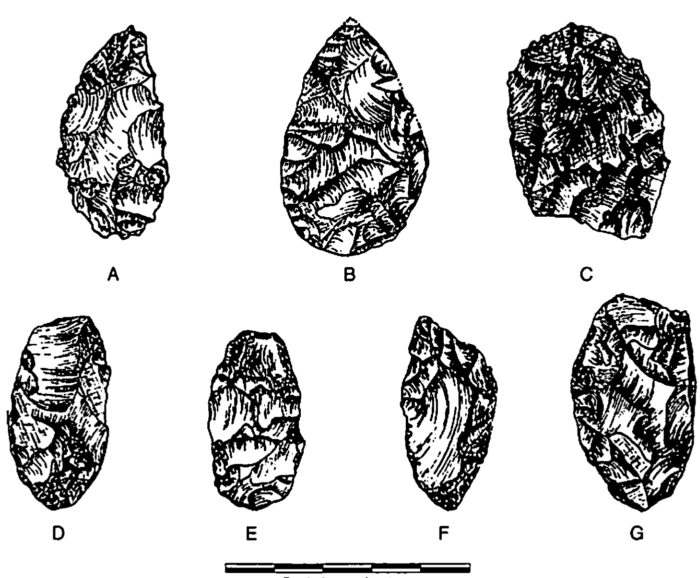


Figure 38. Complete obsidian biface knives: (A) #50, ovate knife, from square S4-L1, depth 8 to 12"; (B) #828, ovate knife, broken in field, from square S11-L0, depth 16 to 20"; (C) #61, ovate knife, broken end, from square S36-L1, depth 8 to 12"; (D) #733, ovate knife, from square S10-L1, depth 16 to 20"; (E) #6, ovate knife, from square S5-L3, depth 4 to 8"; (F) #221, knife, from square S11-L1, depth 16 to 18"; (G) #742, ovate knife, made from flake, from square S45-L4, depth 12 to 16".

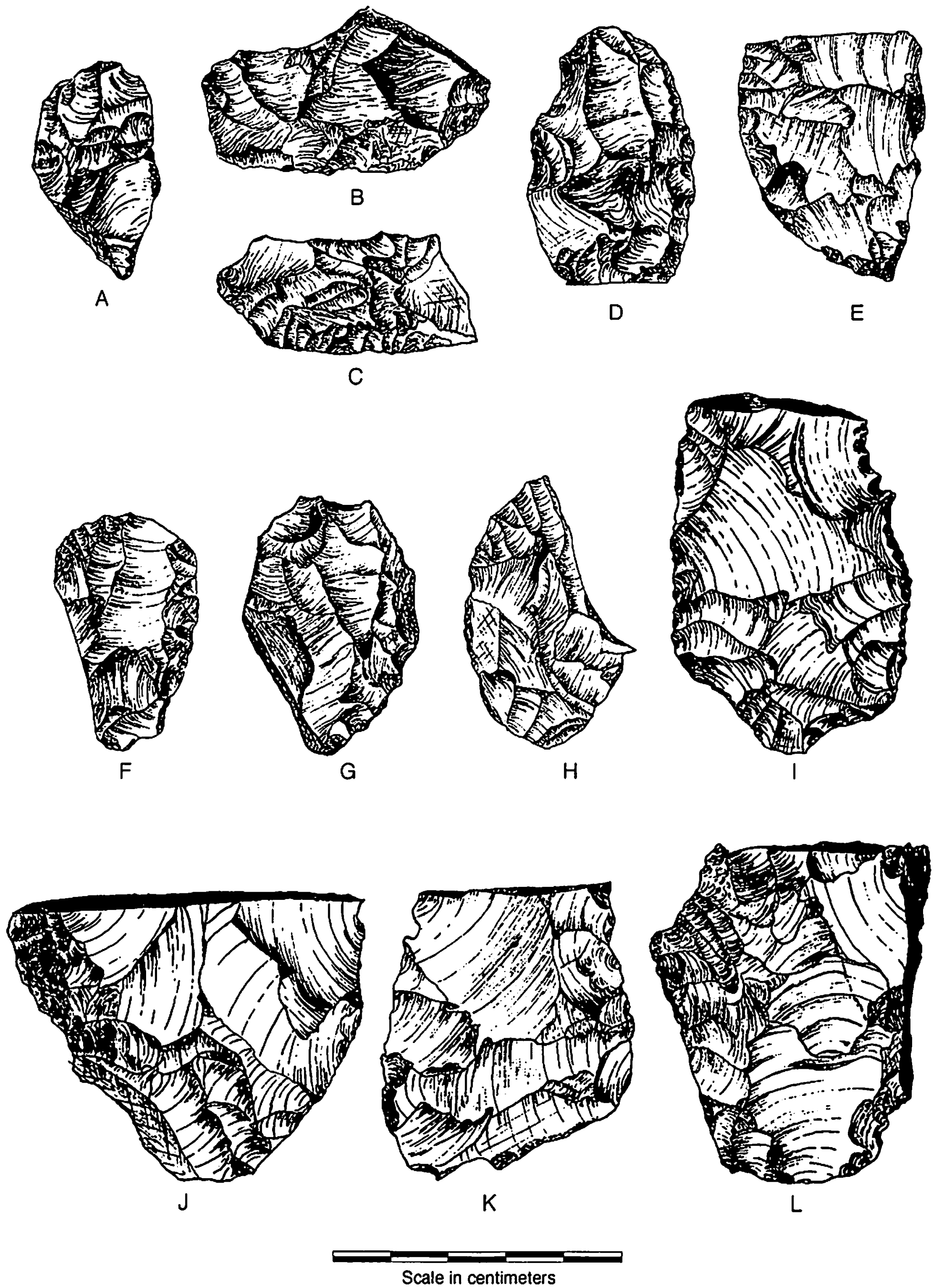


Figure 39. Obsidian biface knife fragments: (A) #397, knife, broken end, from square S9-L0, depth 16 to 20"; (B) #70, knife fragment, from square S8-L1, depth 13"; (C) #597, knife fragment, from square S9-L3, depth 4 to 8"; (D) #203, ovate knife, broken end, from square S18-R2, depth 6"; (E) #172, knife fragment, from square S11-L2, depth 17"; (F) #685, knife fragment, from square S40-R1, depth 12 to 16"; (G) #216, knife fragment, from square S12-L1, depth 8 to 10"; (H) #158, knife fragment, from square S11-L2, depth 16"; (L) #81, knife fragment, from square S13-L0, depth 11"; (J) #67, knife fragment, from square S9-L0, depth 12"; (K) #827, knife fragment, from square S11-L0, depth 8 to 12"; (L) #761, knife fragment, angular edge, from square N0-R1, depth 8 to 12".

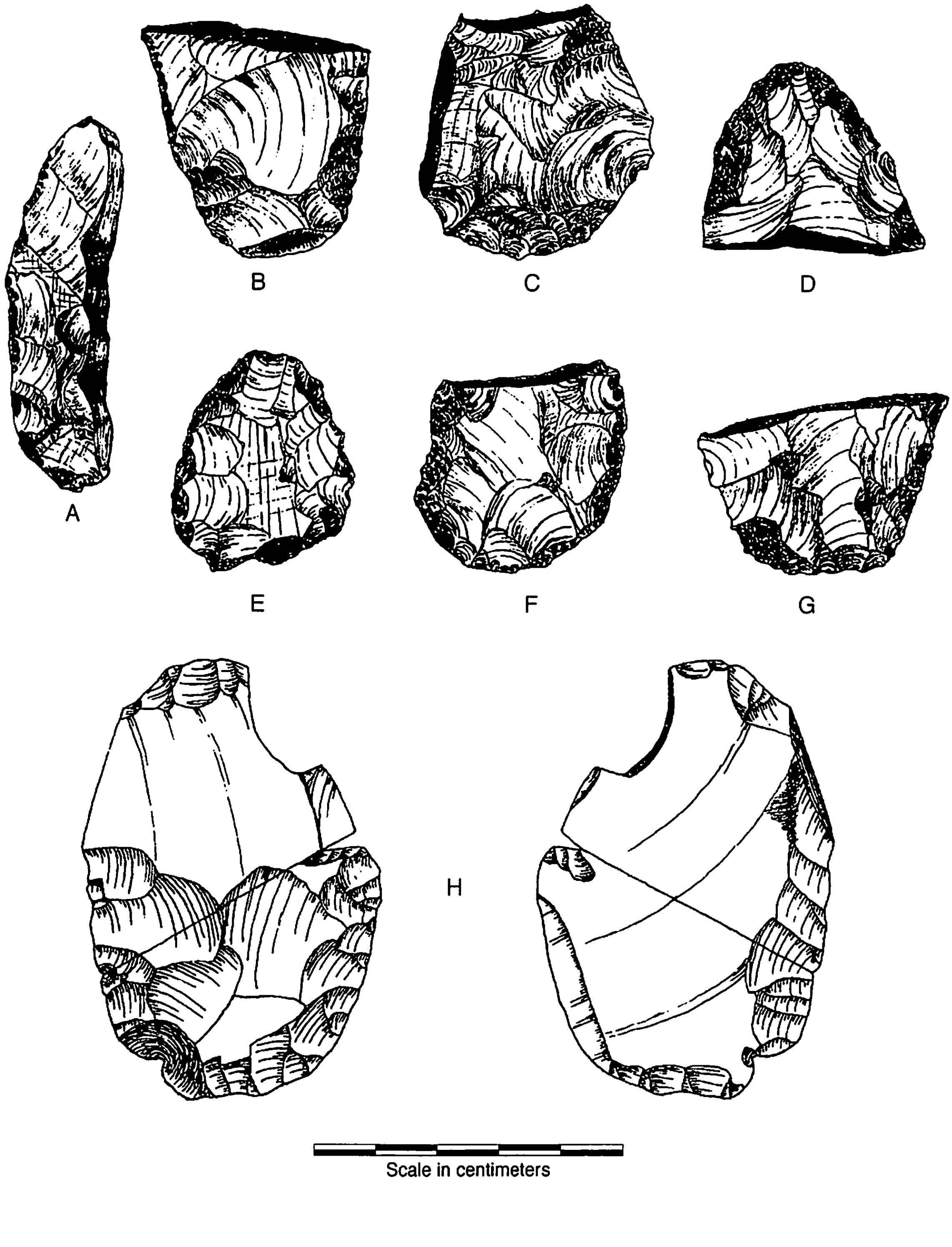


Figure 40. Obsidian biface knife fragments: (A) #398, knife fragment, from square S9-L0, depth 12 to 16"; (B) #785, knife fragment, from square S13-L2, depth 12 to 16"; (C) #73, knife fragment, from square S12-L2, depth 13"; (D) #183, knife fragment, from square S12-L2, depth 17"; (E) #58, knife fragment, from square S13-R1, depth 8 to 12"; (F) #878, knife fragment, from square S13-L3, depth 12 to 16"; (G) #30, knife fragment, from square S37-L0, depth 10 to 12"; (H) #793, broken knife, made from flake, broken in the field, abraded area on upper right side from wear, from square S13-L2, depth 16 to 20".

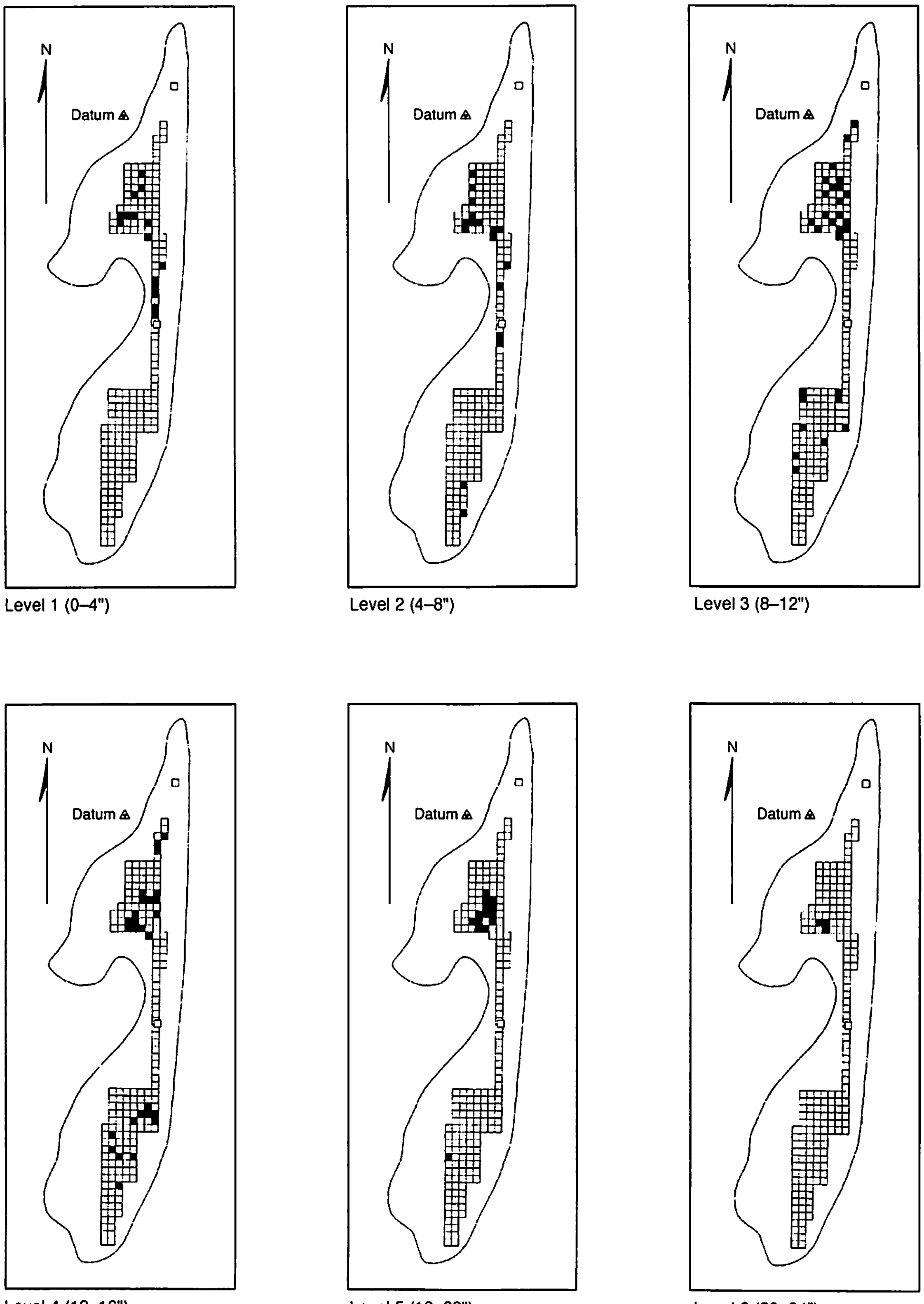


Figure 41. Distribution of bifacial knives by level.

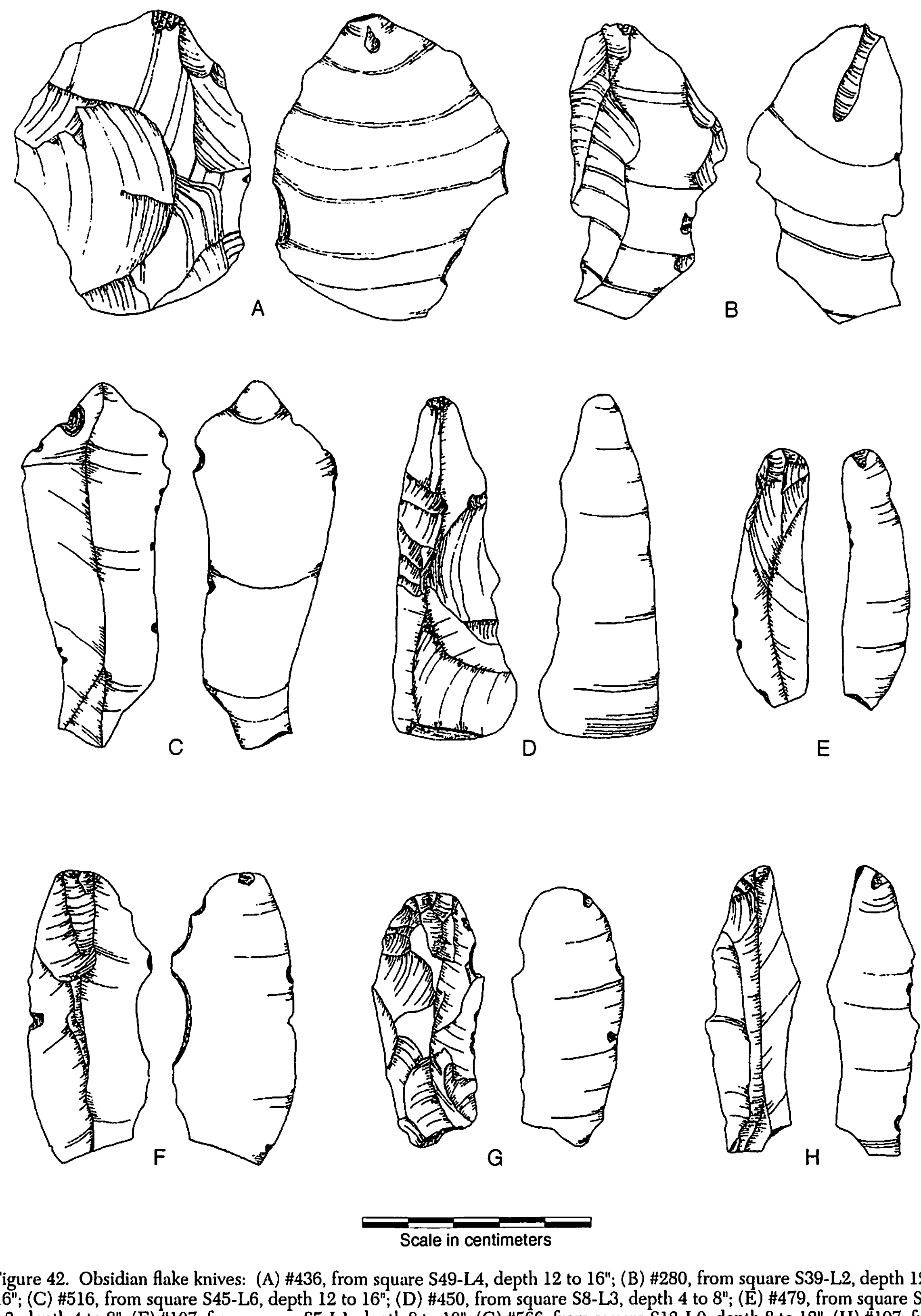


Figure 42. Obsidian flake knives: (A) #436, from square S49-L4, depth 12 to 16"; (B) #280, from square S39-L2, depth 12 to 16"; (C) #516, from square S45-L6, depth 12 to 16"; (D) #450, from square S8-L3, depth 4 to 8"; (E) #479, from square S48-L2, depth 4 to 8"; (F) #107, from square S5-L1, depth 8 to 10"; (G) #566, from square S12-L0, depth 8 to 12"; (H) #197, from square S41-L4, depth 12 to 16".

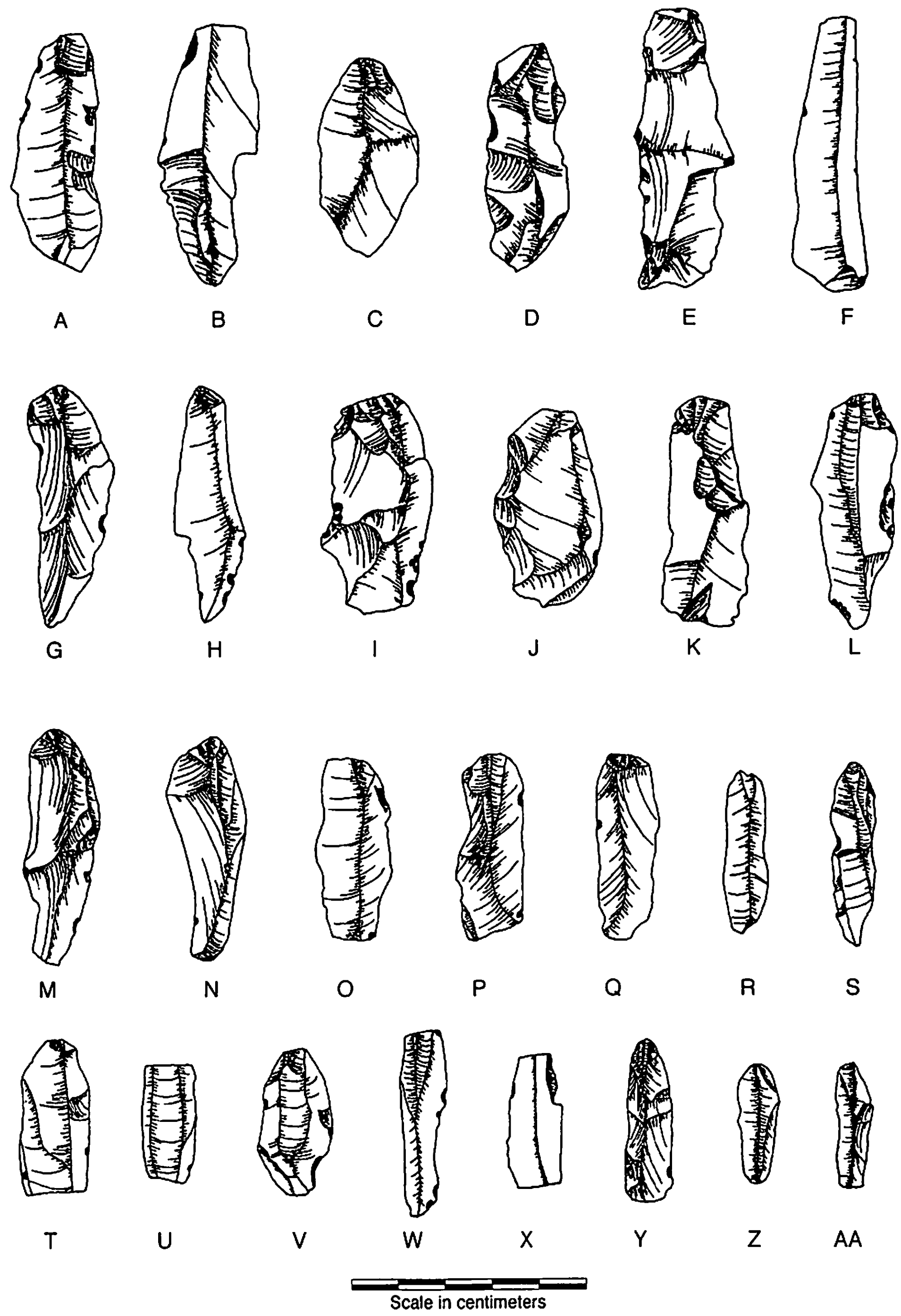


Figure 43. Obsidian flake knives: (A) #449, from square S8-L3, depth 0 to 4"; (B) #406, from square S11-L3, depth 4 to 8"; (C) #665, from square S12-L3, depth 4 to 8"; (D) #541, from square S54-L6, depth 8 to 12"; (E) #436, from square S49-L4, depth 12 to 16"; (F) #239, from square S12-L2, depth 14 to 16"; (G) #465, from square S49-L61, depth 12 to 16"; (H) #415, from square S43-L2, depth 12 to 16"; (I) #665, from square S12-L3, depth 4 to 8"; (J) #662, from square S42-L4, depth 12 to 16"; (K) #110, from square S39-L0, depth 12 to 14"; (1) #581, from square S45-L3, depth 12 to 16"; (M) #178, from square S12-L2, depth 20 to 24"; (N) #142, from square S6-L0, depth 8 to 10"; (O) #730, from square S37-R1, depth 12 to 16"; (P) #218, from square S12-L1, depth 14 to 16"; (Q) #444, from square S7-L2, depth 4 to 8"; (R) #653, from square S1-R1, depth 4 to 8"; (S) #389, from square S46-L5, depth 8 to 12"; (T) #480, from square S48-L2, depth 8 to 12"; (U) #604, from square S40-L1, depth 8 to 12"; (V) #24, from square S37-L1, depth 12 to 14"; (W) #568, from square R2-L0, depth 16 to 20"; (X) #417, from square S46-L6, depth 8 to 12"; (Y) #564, from square S43-L3, depth 12 to 16"; (Z) #663, from square S8-R1, depth 0 to 4"; (AA) #44, from square S38-L1, depth 12 to 14"

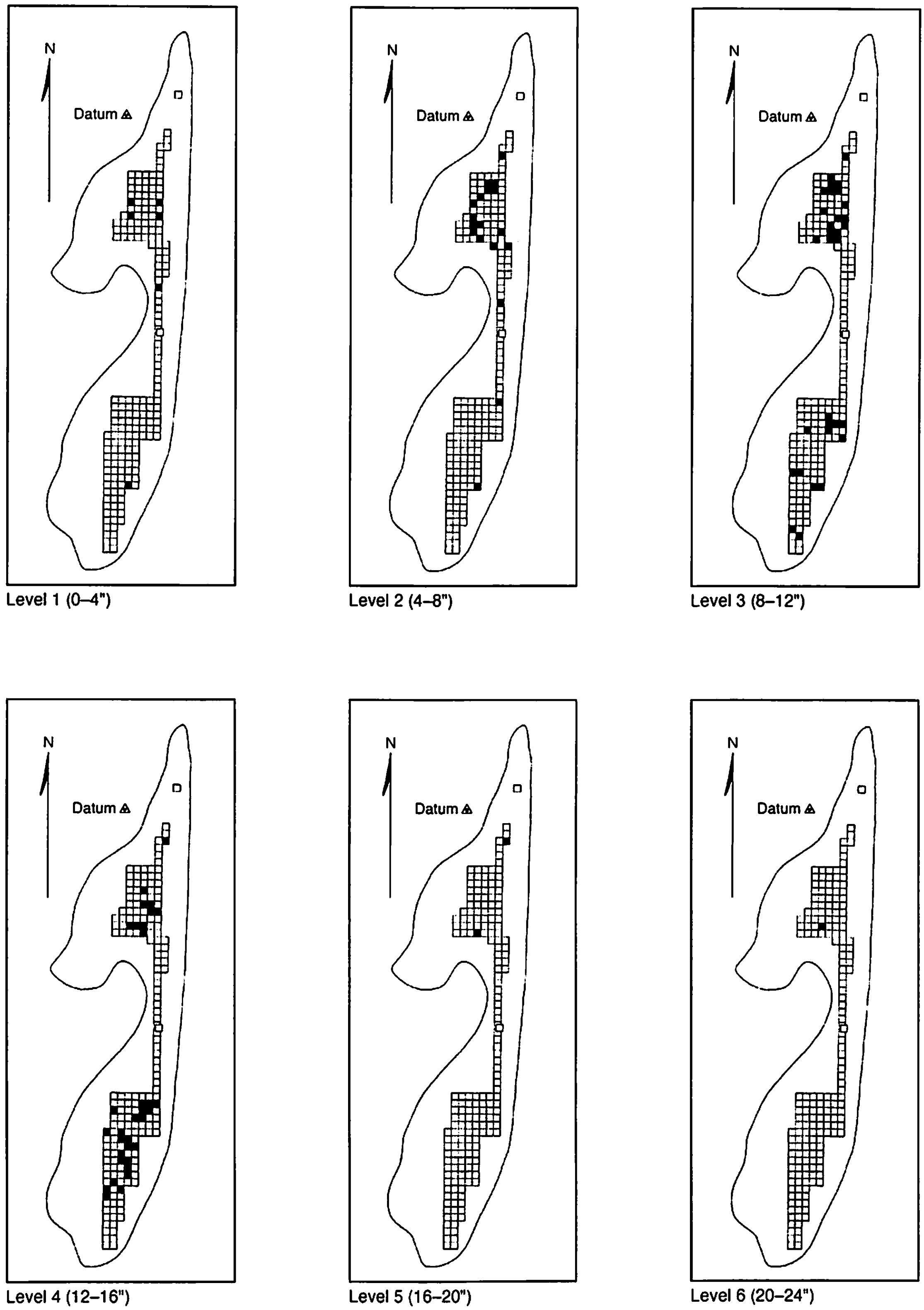


Figure 44. Distribution of flake knives by level

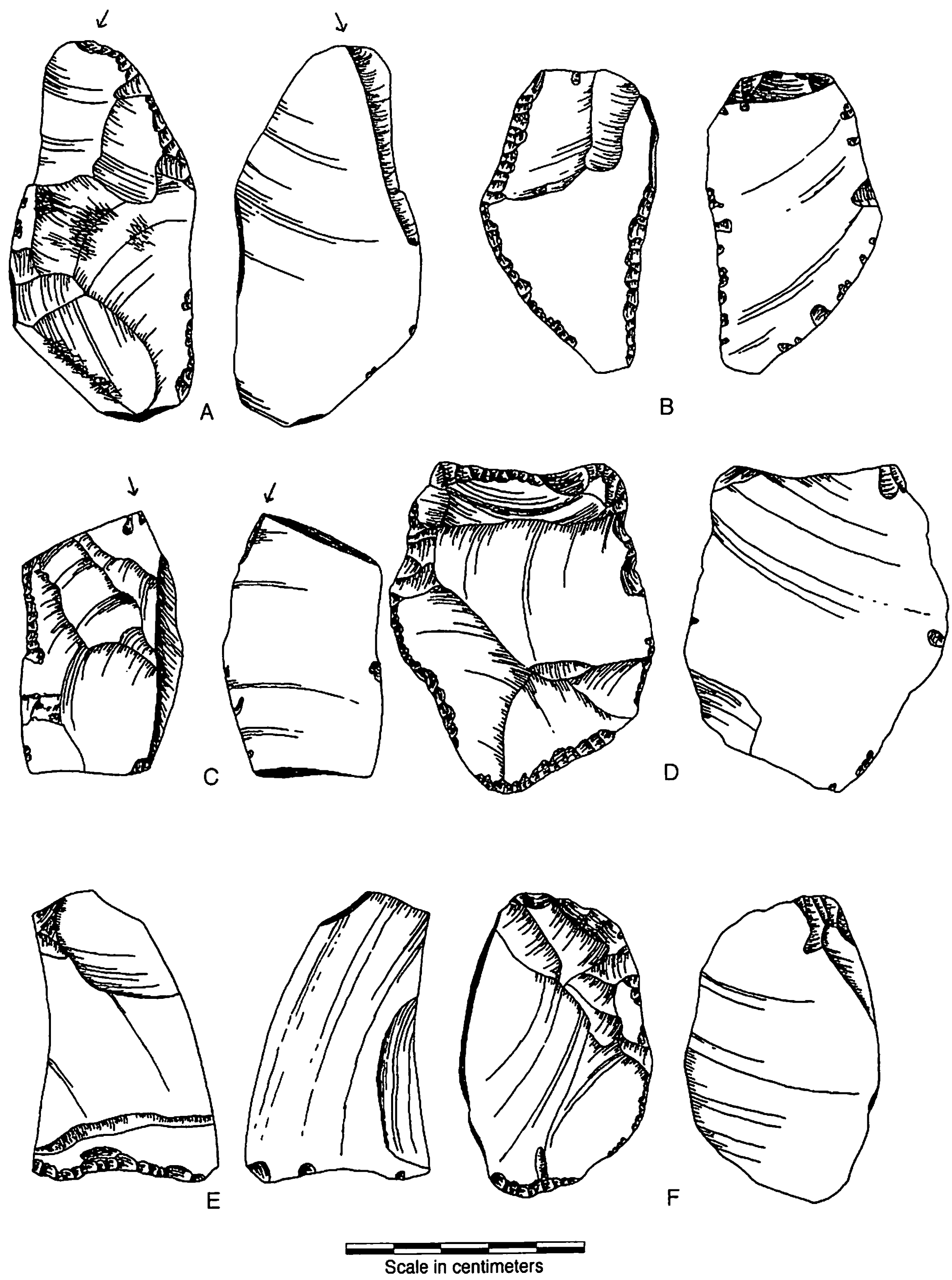


Figure 45. Flake scrapers (arrows indicate burin blows): (A) #51, obsidian, front and back view, one burin facet, from square S40-L2, depth 8 to 12"; (B) #733, obsidian, front and back view, from square S10-L1, depth 16 to 20"; (C) #146, obsidian, front and back view, one burin facet, from square O-S5, depth 8 to 10"; (D) #394, obsidian, front and back view, from square S48-L4, depth 12 to 16"; (E) #178, obsidian, front and back view, from square S12-L2, depth 20 to 24"; (F) #286, obsidian, front and back view, from square S36-R1, depth 12 to 16".

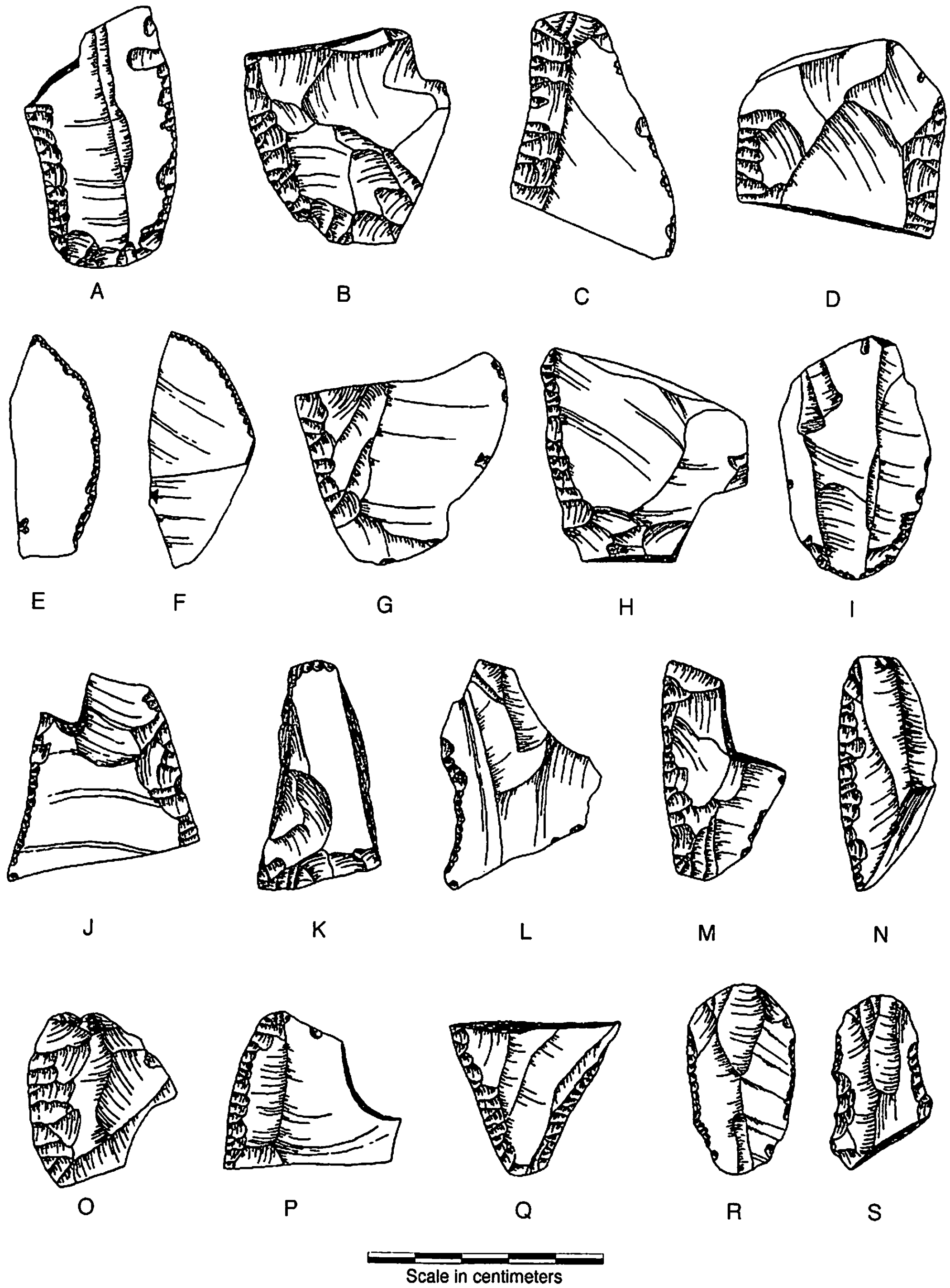


Figure 46. Flake scrapers: (A) #869, obsidian, from square S13-L3, depth 4 to 8"; (B) #642, obsidian, from square S12-L3, depth 16 to 20"; (C) #335, obsidian, from square S9-L1, depth 8 to 12"; (D) #398, obsidian, from square S9-L0, depth 12 to 16"; (E) #859, obsidian, from square S38-R1, depth 8 to 12"; (F) #366, obsidian, from square S12-R1, depth 8 to 12"; (G) #181, obsidian, from square S12-L2, depth 22 to 24"; (H) #831, obsidian, from square S8-L1, depth 16 to 20"; (I) #100, obsidian, from square S6-L0, depth 7"; (J) #354, obsidian, from square S8-L0, depth 12 to 16"; (K) #831, obsidian, from square S8-L1, depth 16 to 20"; (1) #286, obsidian, from square S36-R1, depth 12 to 16"; (M) #804, obsidian, from square S44-L5, depth 12 to 16"; (N) #337, obsidian, from square S9-L1, depth 16 to 20"; (O) #337, obsidian, from square S9-L1, depth 16 to 20"; (P) #335, obsidian, from square S9-L1, depth 8 to 12"; (Q) #280, obsidian, from square S39-L2, depth 12 to 16"; (r) #93, obsidian, from square S43-L5, depth 8 to 12"; (S) #320, obsidian, from square S28-R1, depth 0 to 4".

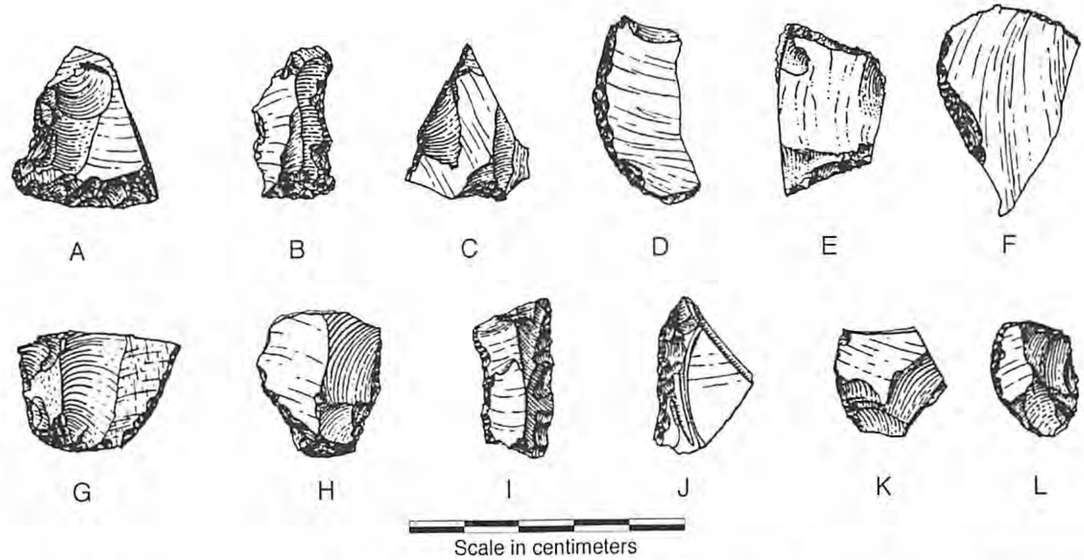


Figure 47. Flake scrapers: (A) #109, obsidian, from square O-S38, depth 10 to 12"; (B) #536, obsidian, from square S46-L2, depth 12 to 16"; (C) #641, obsidian, from square S41-L1, depth 12 to 16"; (D) #612, obsidian, from square S39-L1, depth 12 to 16"; (E) #280, flint, from square S39-L2, depth 12 to 16"; (F) #220, obsidian, from square S11-L1, depth 14 to 16"; (G) #730, obsidian, from square S37-R1, depth 12 to 16"; (H) #662, obsidian, from square S42-L4, depth 12 to 16"; (I) #427, obsidian, from square S46-L6, depth 0 to 4"; (J) #110, obsidian, from square O-S38, depth 12 to 14"; (K) #313, obsidian, from square S39-L5, depth 8 to 12"; (1) #448, obsidian, from square S13-L5, depth 4 to 8".

erately produced by percussion or pressure, either to shape the scraping edge or to resharpen it for further work.

Experiments in the laboratory with obsidian flakes have produced similar artifacts. When a relatively thin, unmodified obsidian flake is used upon wood or bone for a scraper, the scraping process removes small chips from the edge, and continued use will produce a retouched scraper. Finely retouched edges are produced by scraping soft wood (white pine), hard wood (oak) and deer antler. The size of the flake scar produced depends upon the hardness of the material as well as upon the force applied in the scraping process. Most of the flake scars, however, range in length from 0.1 to 3.0 mm, longer scars being rare or requiring a special effort to produce them. After the scraper has been used for some time, the edge becomes dulled, and it is no longer efficient unless it is resharpened by secondary trimming. Trimming with a hammer stone usually results in longer flake scars, commonly up to 5.0 or 8.0 mm in length; this also helps to straighten an irregular edge.

The flake scrapers from El Inga are believed to be primarily utilized flakes in which the scraping edge has been produced by usage or resharpening to create a fresh working edge. The flake scrapers would be most effective for the working of wood and bone, and many of them would not be suitable for preparing skins or hides.

The flake scrapers range in size from a small fragment less than 1.0 to 8.2 cm in length. Three specimens are made of flint, one from level 3 (8 to 12"), and two from level 4 (12 to 16"); five specimens are made of basalt. The basalt specimens occur as follows; one in level 1 (0 to 4"), three in level 2 (4 to 8"), and one in level 4 (12 to 16"). The remainder are all of obsidian (604 specimens) with a maximum number occurring in level 3 (8 to 12"). Vertical distribution of flake scrapers according to the depth from the surface is shown in Table 8. The horizontal distribution according to the various levels is shown in Figure 48.

The flake scrapers occur throughout all levels and in all sections of the site. A comparison of

Table 8. Vertical distribution of flake scrapers.

Depth in inches	Flake scrapers
0 to 4	135
4 to 8	151
8 to 12	166
12 to 16	119
16 to 20	32
20 to 24	6
Total	612

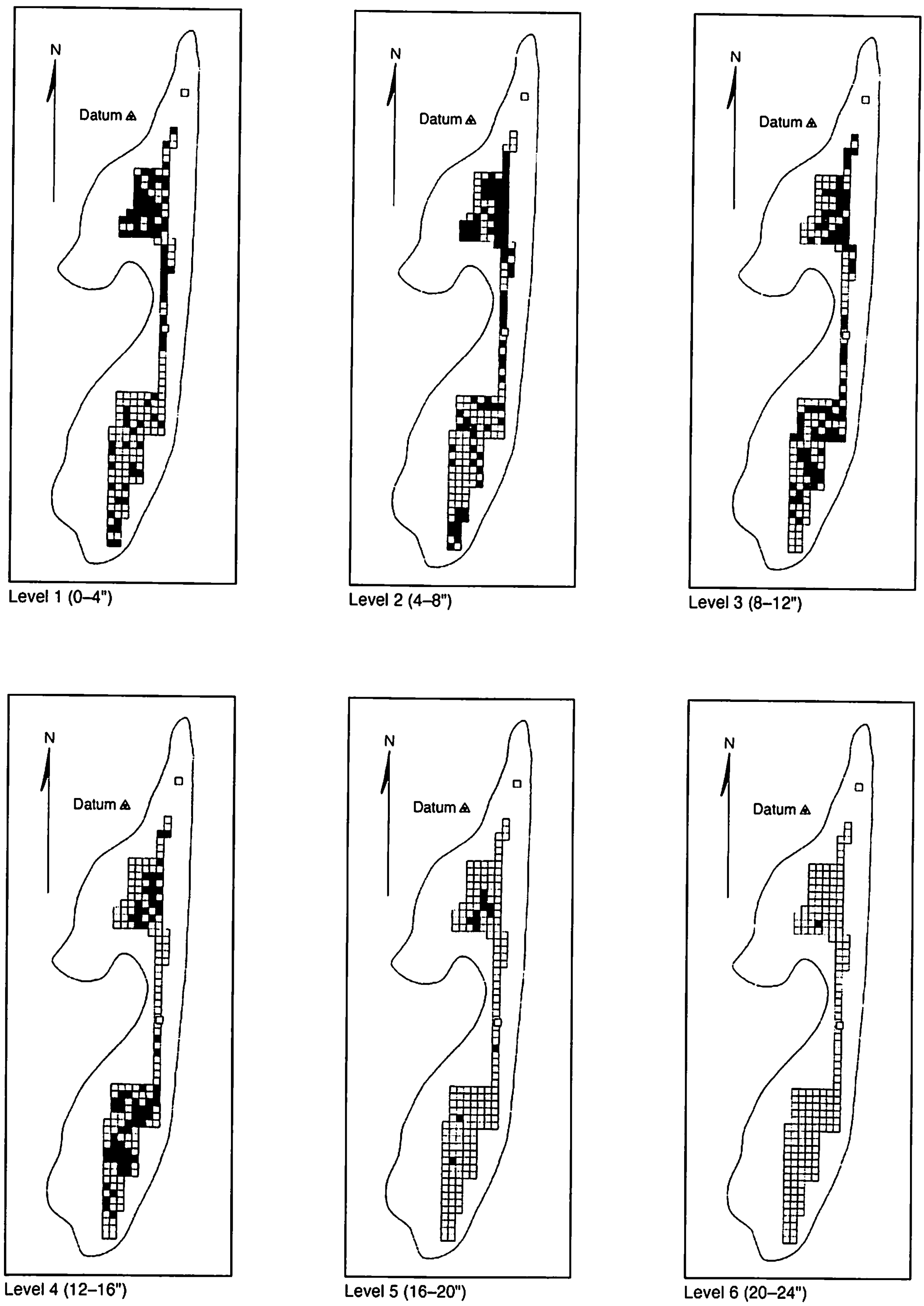


Figure 48. Distribution of flake scrapers by level.

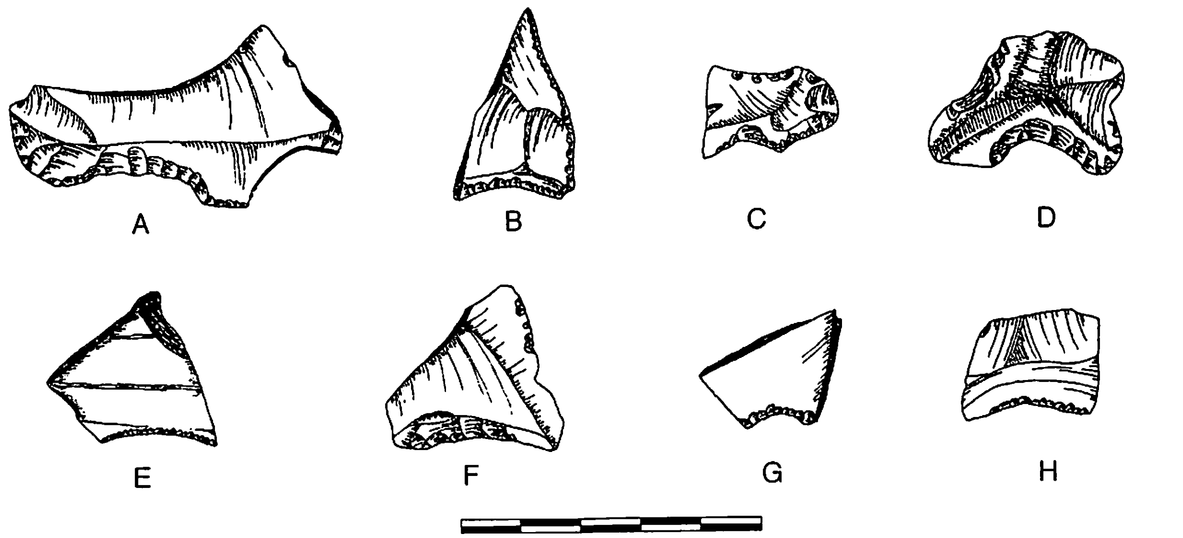


Figure 49. Concave flake scrapers: (A) #777, obsidian, from square S13-L1, depth 12 to 16"; (B) #877, obsidian, from square S9-R1, depth 4 to 8"; (C) #327, obsidian, from square S13-L2, depth 0 to 4"; (D) #542, obsidian, from square S50-L5, depth 0 to 4"; (E) #391, obsidian, from square S26-R1, depth 8 to 12"; (F) #484, obsidian, from square S45-L5, depth 12 to 16"; (G) #25, obsidian, from square S37-L1, depth 10 to 12"; (H) #273, obsidian, from square S22-R1, depth 4 to 8".

specimens from the lower levels with the upper levels suggests that larger flakes are more common in the lower levels; the presence of plowing and possible breakage in the upper levels, however, may have contributed to this distinction.

One specimen, illustrated in Figure 45A, exhibits areas of extensive wear upon one surface. The significance of this abrasion is not apparent.

Concave Flake Scrapers

There are 45 flake scrapers in which the scraping edge is concave or slightly hollowed out. Examples of concave scrapers are shown in Figure 49. They are made from small flakes, and the curved scraping edge appears to have been made by usage in shaping cylindrical objects. The size ranges from 2.0 to 5.6 cm in maximum length with most examples falling between 2.0 and 4.0 cm. One specimen is made of basalt (level 1), one is of flint (level 3), and the remainder are made of obsidian.

Table 9. Vertical distribution of convex flake scrapers.

Depth in inches	Convex flake scrapers
0 to 4	12
4 to 8	12
8 to 12	14
12 to 16	7
16 to 20	0
20 to 24	0
Total	45

The distribution according to depth is shown in Table 9, and it is interesting that no examples are found below level 4 (12 to 16"). The horizontal distribution according to the various levels is shown in Figure 50. Although the sample is small, the concentration of specimens toward the southern section of the excavations in level 3 (8 to 12") may be significant.

Blade-like Scrapers

There are 36 relatively long and narrow flakes that are classed as blade-like scrapers. These resemble the flake scrapers except that they are relatively narrow and more blade-like in outline (Fig. 51). They do not appear to be true blades (prismatic flakes, lamellar flakes) as they were not struck from a faceted core (polyhedral core).

All of the specimens are made of obsidian with a single exception, made of flint, found in level 4 (12 to 16"). They exhibit a scraping edge on one or both sides and occasionally at the ends. The flake scars are small in size and suggest that they were produced through use as a scraper. The length ranges from 2.7 to 7.7 cm, and all examples are quite thin in cross section. The distribution according to depth in the excavations is shown in Table 10, and the horizontal distribution according to the square and level is shown in Figure 52. The specimens are most abundant in level 4 (12 to 16") and at the southern section of the excavations.

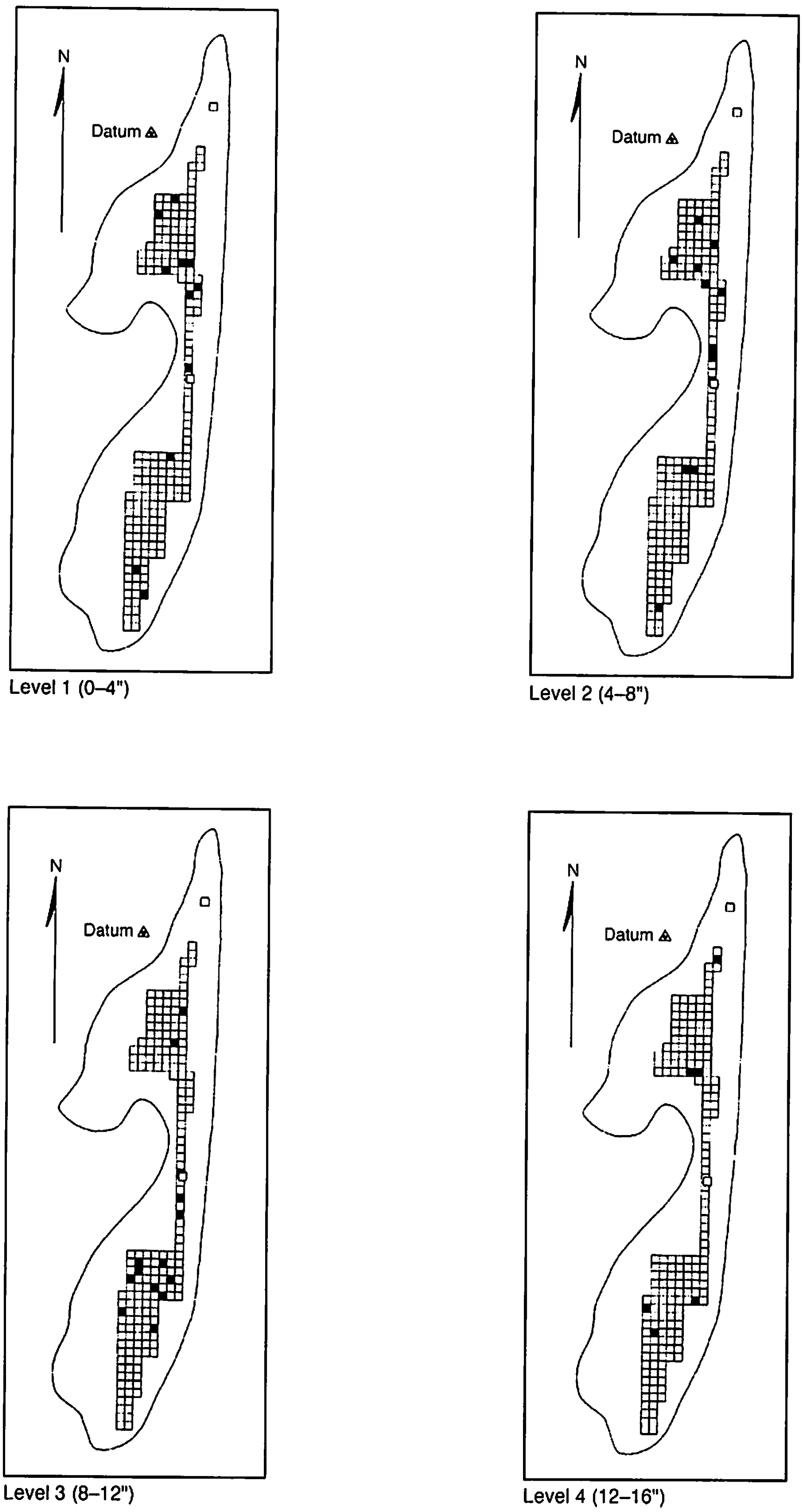


Figure 50. Distribution of concave flake scrapers by level.

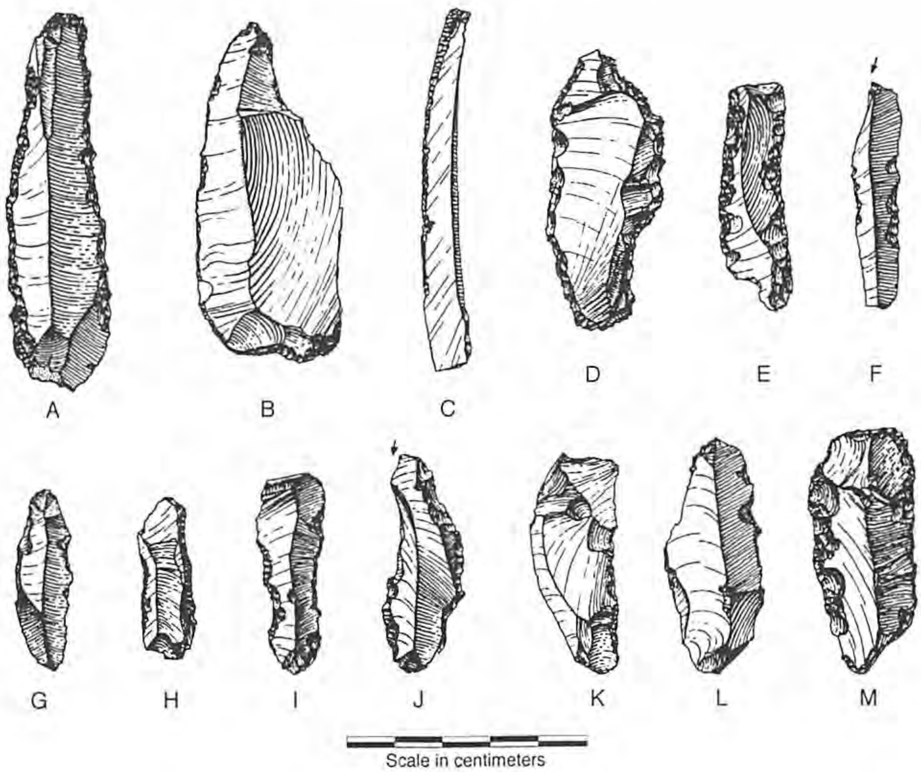


Figure 51. Blade-like scrapers (arrow indicates burin blow): (A) #127, obsidian, from square S41-L6, depth 12 to 16"; (B) #234, obsidian, from square S12-L2, depth 24 to 26"; (C) #611, obsidian, from square S40-L1, depth 12 to 16"; (D) #180, obsidian, from square S12-L1, depth 15"; (E) #197, obsidian, from square S41-L4, depth 12 to 16"; (F) #737, obsidian, burin facet at one end, from square S5-R1, depth 4 to 8"; (G) #435, obsidian, from square S49-L4, depth 8 to 12"; (H) #583, obsidian, from square S47-L3, depth 8 to 12"; (I) #445, obsidian, from square S6-L3, depth 0 to 4"; (J) #300, obsidian, burin facet at one end, from square N2-R2, depth 12 to 16"; (K) #468, obsidian, from square S17-R2, depth 4 to 8"; (L) #35, obsidian, from square O-S38, depth 6 to 8"; (M) #733, obsidian, from square S10-L1, depth 16 to 20".

Plano-convex Scrapers

There is a total of 156 plano-convex scrapers including whole and fragmentary specimens of obsidian, flint, and basalt. Of these, 133 are made of obsidian, 18 are of basalt, and 5 are of flint.

The plano-convex scrapers contrast with the flake scrapers in that they are thicker in cross section, more carefully shaped by intentional flaking, and feature a thick, snub-nosed scraping edge. One surface is flat, usually representing the flake scar of a large flake from which the scraper was manufactured; the other surface is convex and displays numerous flake scars from the secondary chipping. The scraping edge shows more careful preparation, and, although these specimens would serve equally well for scraping wood or bone, it is suggested that they were used primarily in hide or skin preparation.

Table 10. Vertical distribution of blade-like flake scrapers.

Depth in inches	Blade-like flake scrapers
0 to 4	5
4 to 8	5
8 to 12	11
12 to 16	13
16 to 20	1
20 to 24	1
Total	36

There is considerable variation in form, size, and thickness. The shapes includes triangular, ovate, circular, semicircular, roughly rectangular, and other forms, none of which appears distinctive for any particular level of the site. Most forms are made in both obsidian or basalt, and occasionally in flint. Only one form is represented by several examples. This is a thick, keeled or humpbacked scraper having a narrow elliptical outline. Illustrations of this type are shown in Figure 54I and J, and Figure 56D, E, G, H, and I. There are 10 examples of this type, including

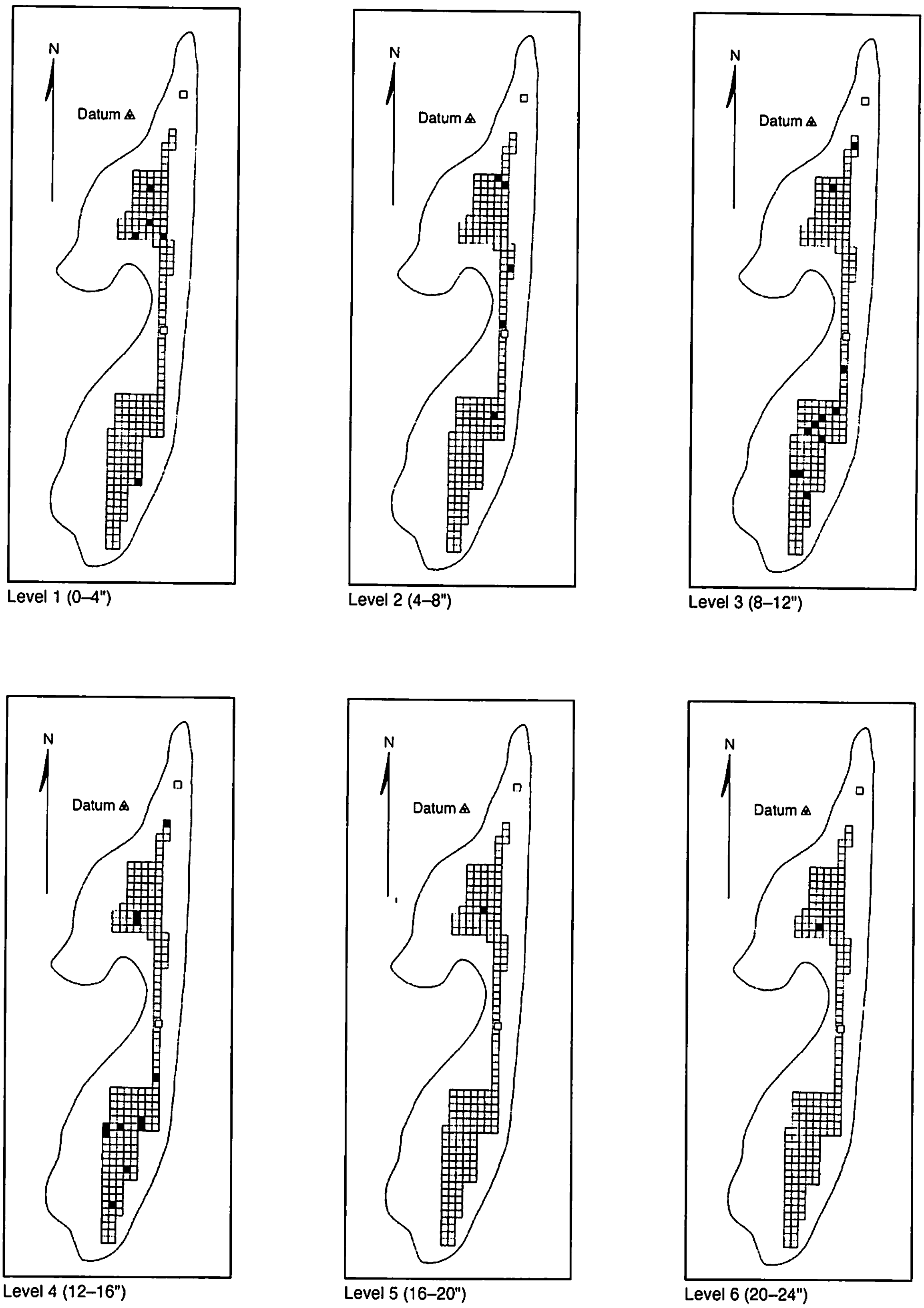


Figure 52. Distribution of blade-like scrapers by level.

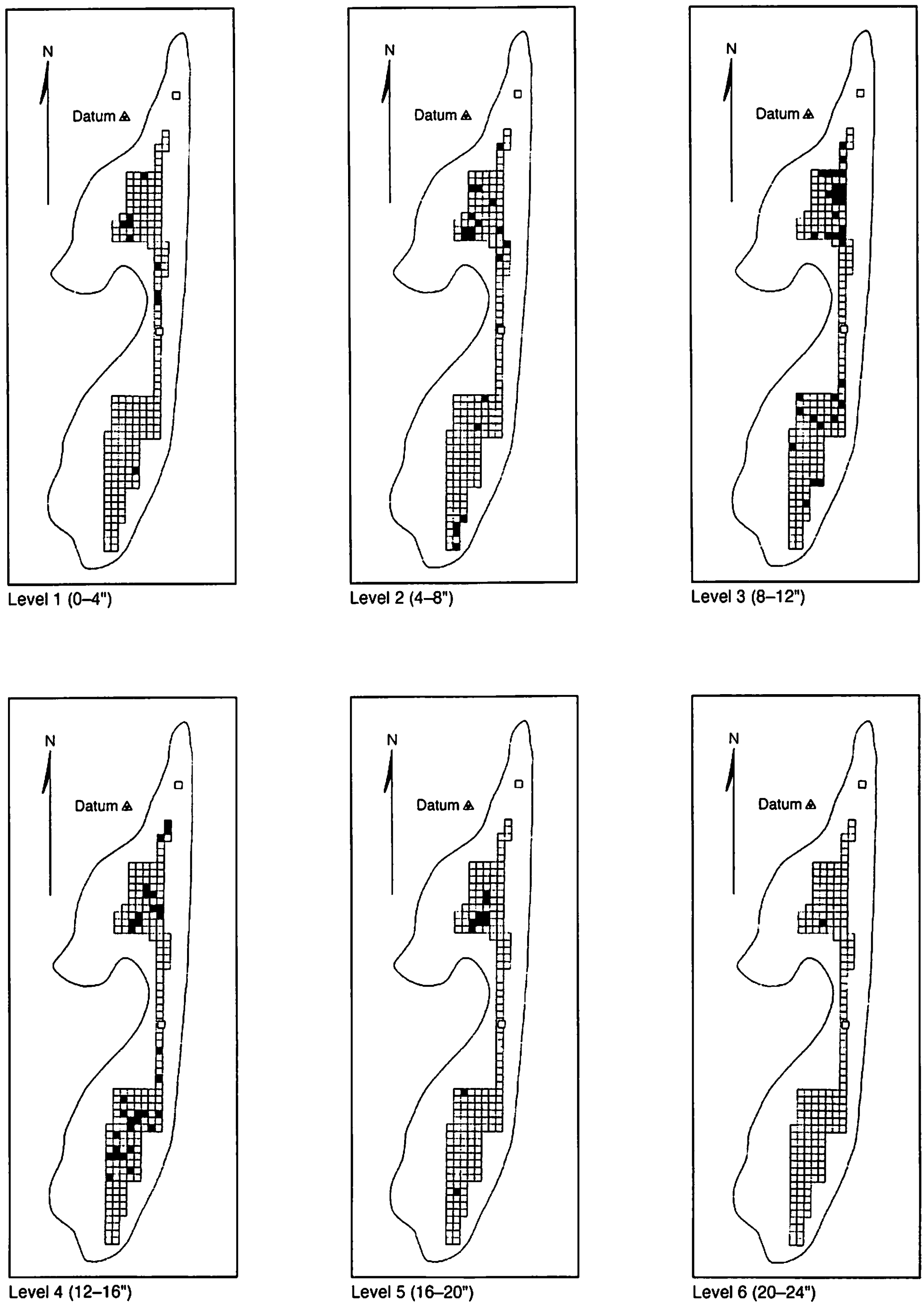


Figure 53. Distribution of obsidian plano-convex scrapers by level.

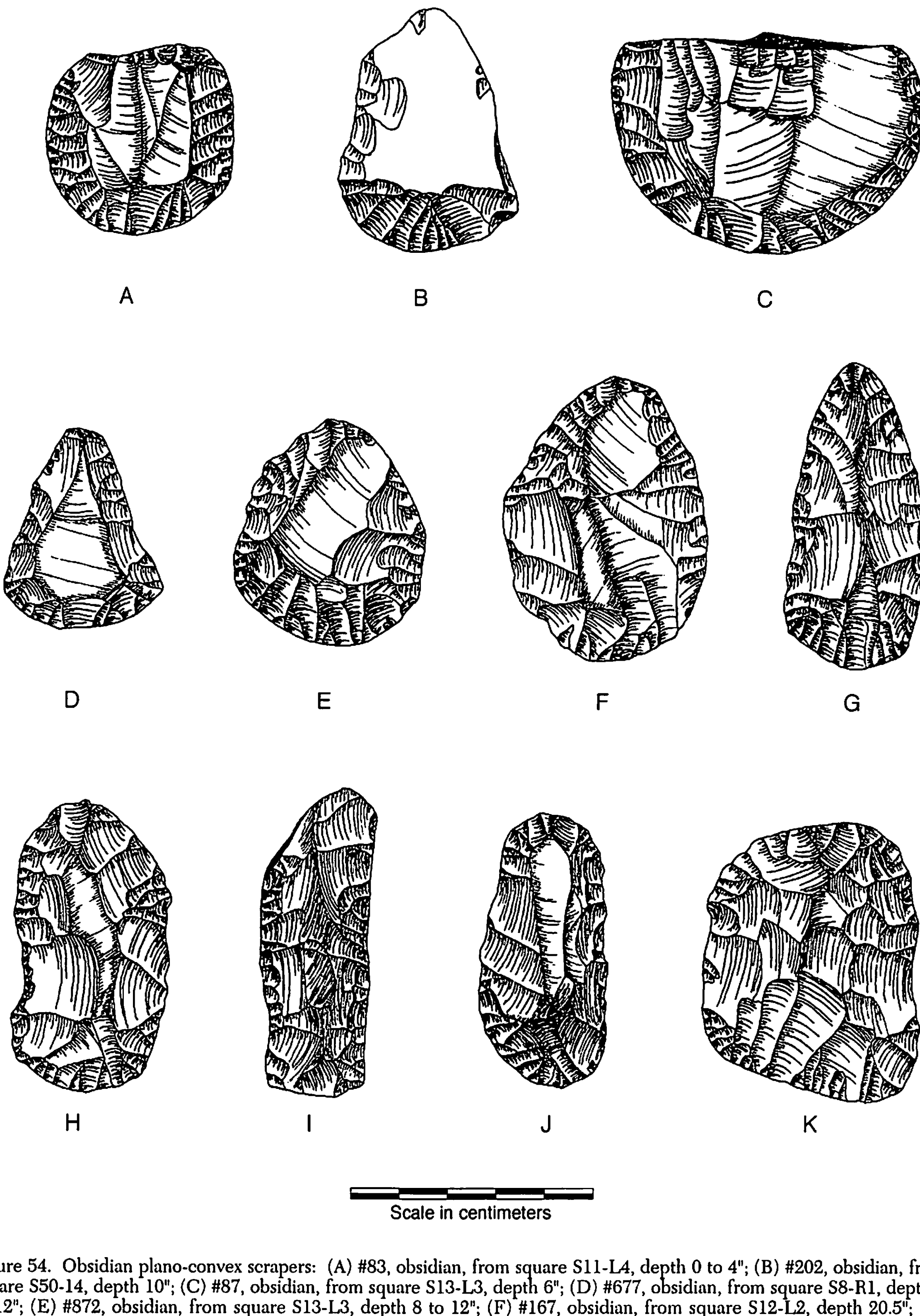


Figure 54. Obsidian plano-convex scrapers: (A) #83, obsidian, from square S11-L4, depth 0 to 4"; (B) #202, obsidian, from square S50-14, depth 10"; (C) #87, obsidian, from square S13-L3, depth 6"; (D) #677, obsidian, from square S8-R1, depth 8 to 12"; (E) #872, obsidian, from square S13-L3, depth 8 to 12"; (F) #167, obsidian, from square S12-L2, depth 20.5"; (G) #116, obsidian, from square S44-L3, depth 12.5"; (H) #301, obsidian, from square S11-R1, depth 12 to 16"; (I) #72, obsidian, broken at each end, from square S12-L2, depth 15.5"; (J) #750, obsidian, from Square S10-R1, depth 12 to 16"; (K) #187, obsidian, from square O-R1, depth 14".

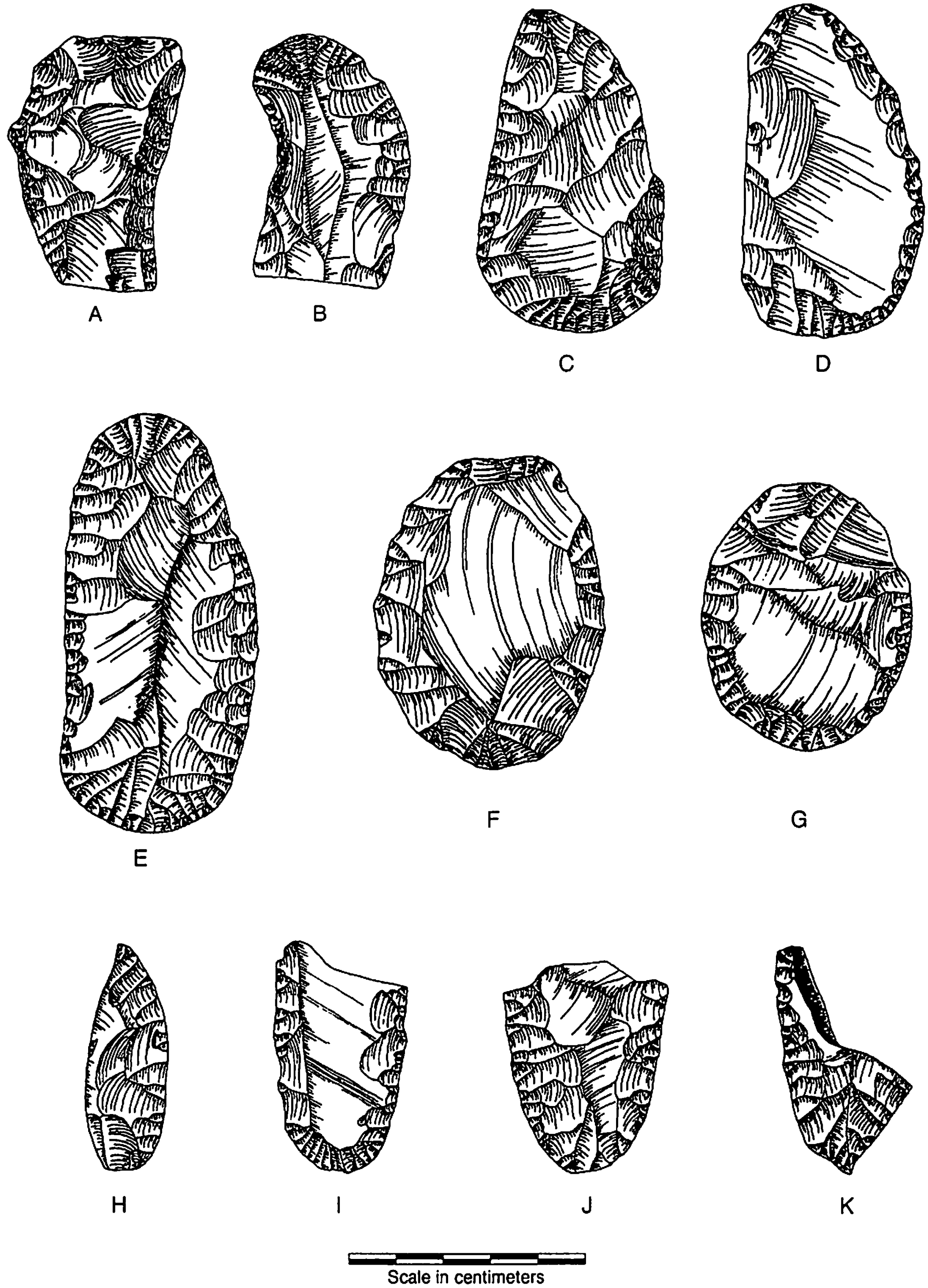


Figure 55. Obsidian plano-convex scrapers: (A) #157, obsidian, from square S12-L3, depth 13"; (B) #121, obsidian, from square S12-L4, depth 6"; (C) #201, obsidian, from square S30-R1, depth 12 to 16"; (D) #163, obsidian, from square S8-L1, depth 14"; (E) #114, obsidian, from control block of Stratigraphic Block #3, depth 18"; (F) #119, obsidian, from square S12-L2, depth 17"; (G) #16, obsidian, from square S41-L3, depth 12 to 16"; (H) #224, obsidian, broken, possibly a burin spall from a concave scraper-burin core, from square S11-L2, depth 4 to 6"; (I) #847, obsidian, broken, from square S6-L2, depth 4 to 8"; (J) #356, obsidian, broken, from square S12-R1, depth 4 to 8"; (K) #276, obsidian, broken, possibly a burin spall from a concave scraper-burin core, from square S20-R1, depth 4 to 8".

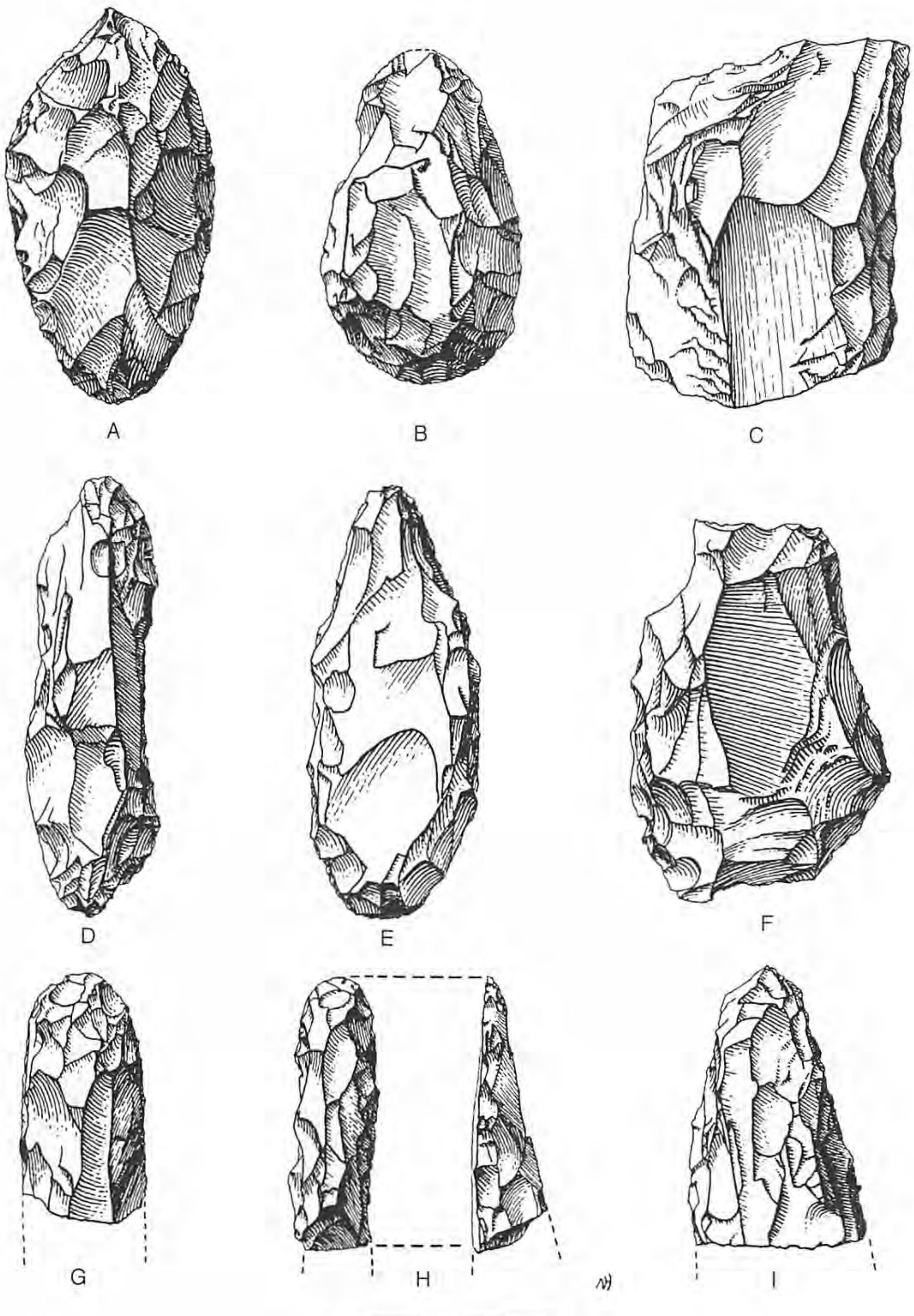


Figure 56. Basalt plano-convex scrapers: (A) #56, basalt, from square S11-L1, depth 0 to 4"; (B) #150, basalt, damaged in excavation, from square S50-L4, depth 11"; (C) #2, basalt, from square 0-S4, depth 8 to 12"; (D) #134, basalt, from square S6-L1, depth 8 to 10"; (E) #8, basalt, from square S10-L1, depth 10"; (F) #49, basalt, from square S12-L2, depth 4.5"; (G) #85, basalt, broken, from square S52-L6, depth 16 to 20"; (H) #198, top and side view, basalt, from square S9-L2, depth 7.5"; (I) #744, basalt, from square S10-R1, depth 8 to 12".

fragments: one of flint, three of obsidian, and six of basalt. They are widely distributed ranging from the surface to a depth of 20".

In general, the plano-convex scrapers are medium to large in size. The obsidian examples range from 3.3 to 7.0 cm, with an average size falling between 5.0 and 6.0 cm. The basalt specimens tend to be larger, ranging from 6.0 to 9.0 cm, with over half of them being toward the larger end of this range.

The distribution of obsidian (including the five flint specimens) scrapers according to depth is shown in Table 11.

The distribution of basalt scrapers according to depth is shown in Table 12. The obsidian specimens are more plentiful in level 4 while the basalt specimens are most abundant from level 3 upward.

There are 133 obsidian plano-convex scrapers; 32 are relatively whole specimens while 101 are represented by fragments. Examples of the obsidian plano-convex scrapers are shown in Figures 54 and 55. The horizontal distribution according to the various levels is shown in Figure 53.

The basalt plano-convex scrapers are represented by 18 specimens, 10 of which are complete. Figure 56 illustrates examples of the basalt scrapers. The site distribution according to the various levels is shown in Figure 57.

Striated Scrapers

In working with the artifacts from El Inga, it was noted that certain specimens exhibit fine scratches or striations upon one surface. Furthermore, specimens displaying this wear were reasonably consistent in form and sufficiently abundant to represent a characteristic artifact for the site; therefore, all examples, including broken fragments, have been placed in the same class and are designated as striated scrapers.

The typical striated scraper is represented by a relatively long and narrow flake, usually with some retouching along one or both edges in the midsection area. The unmodified surface displays fine striations, caused by wear, across the midsection or narrow section of the flake. The striated scraper was apparently used as a tool resembling a spokeshave or draw-knife. The retouching was done to sharpen the edge or to make the tool more effective as a draw-knife. Examples of striated scrapers are illustrated in Figure 58.

All of the examples classed in this group show fine striations; in some specimens the wear is slight while in others it is extensive and has dulled the shiny surface of the obsidian. It is not clear as to what agent produced the striations upon this particular tool. Although suitable for working wood or bone, these substances are not hard enough to scratch the obsidian, and laboratory attempts to create this effect by scraping wood or bone met with failure.

There is considerable variation in the class of striated scrapers in so far as form is concerned. Some specimens have retouching on both edges so that the flake is quite constricted in the midsection (Fig. 58A); others have retouching only along one edge (Fig. 58E). Also, some examples are represented by heavy triangular sectioned flakes of suitable form which served this purpose without retouching (Fig. 58I). A number of specimens is broken, commonly at the midpoint, apparently from strain in this area during usage (Fig. 58J–M). Broken pieces were commonly reworked at the ends to produce a burin by the removal of one or more burin spalls (Fig. 58M–N). There are also some secondary burin spalls derived from striated scrapers (Fig. 59B–D). Other fragments include midsections or irregular pieces too small for salvage, but, nonetheless, are recognizable as portions from striated scrapers (Fig. 59F–G).

There is a total of 82 striated scrapers from the excavations. Of these, 30 are relatively complete, 7 show burin facets, 4 are secondary burin spalls,

Table 11. Vertical distribution of obsidian plano-convex scrapers.

Depth in inches	Plano-convex scrapers (obsidian)
0 to 4	10
4 to 8	26
8 to 12	39
12 to 16	48
16 to 20	11
20 to 24	4
Total	138

Table 12. Vertical distribution of basalt plan-convex scrapers.

Depth in inches	Plano-convex scrapers (basalt)
0 to 4	4
4 to 8	4
8 to 12	7
12 to 16	2
16 to 20	1
20 to 24	
Total	18

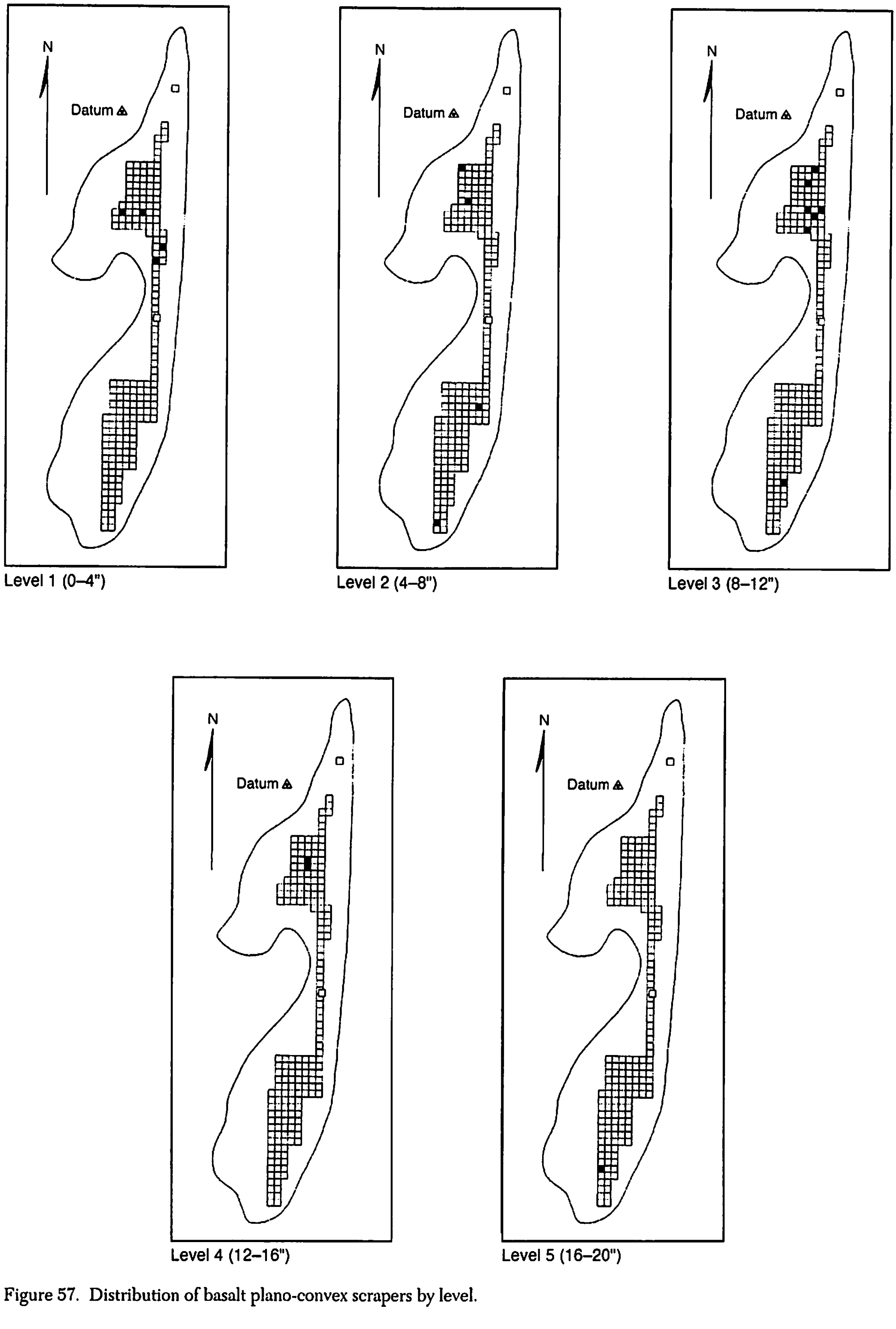


Figure 57. Distribution of basalt plano-convex scrapers by level.

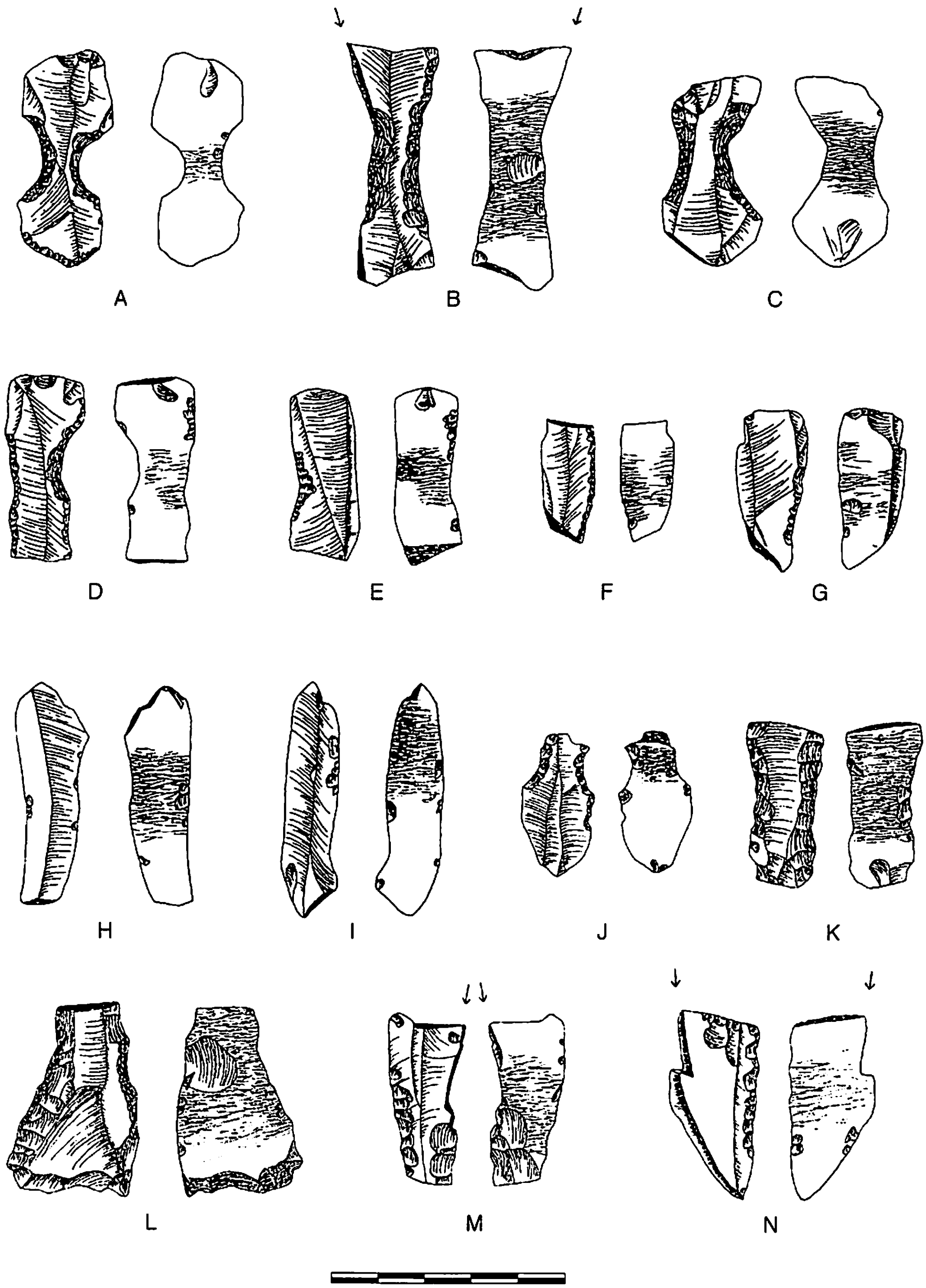


Figure 58. Striated scrapers (arrows indicate burin blows): (A) #498, obsidian, from square S2-R1, depth 4 to 8"; (B) #491, obsidian, from square O-S4, depth 4 to 8"; (C) #652, obsidian, from square S51-L6, depth 0 to 4"; (D) #224, obsidian, from square S11-L2, depth 4 to 6"; (E) #867, obsidian, from square S44-L3, depth 4 to 8"; (F) #857a, obsidian, from square S7-R1, depth 4 to 8"; (G) #669, obsidian, from square S30-R1, depth 8 to 12"; (H) #857b, obsidian, from square S7-R1, depth 4 to 8"; (I) #325, obsidian, from square S41-L2, depth 8 to 12"; (J) #416, obsidian, broken in half, from square S46-L6, depth 4 to 8"; (K) #794, obsidian, from square S4-L2, depth 4 to 8"; (L) #282, obsidian, broken in half, from square S37-L4, depth 8 to 12"; (M) #531, obsidian, broken in half, from square S56-L5, depth 0 to 4"; (N) #271, obsidian, from square S23-R1, depth 0 to 4". Illustrations show both front and back views. Striations are indicated upon the right figure or back view.

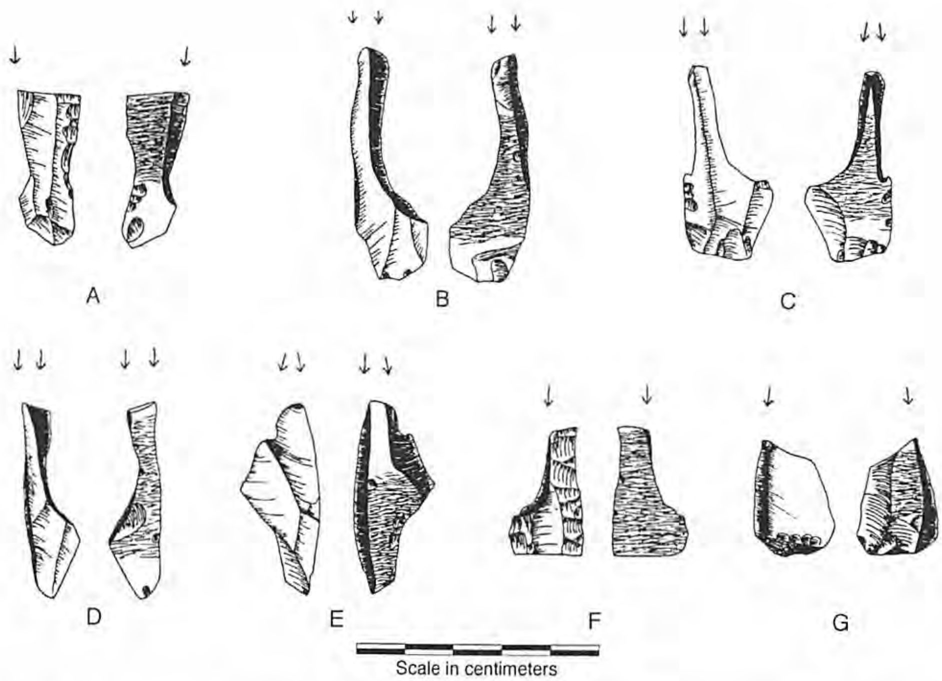


Figure 59. Striated scraper fragments showing both front and back views. Striations are indicated upon the right figure or back view. Arrows indicate burin blows. Striated scraper fragments: (A) #877, obsidian, from square S9-R1, depth 4 to 8"; (B) #498, obsidian, from square S2-Rl, depth 4 to 8"; (C) #352, obsidian, from square 0-S8, depth 4 to 8"; (D) #748, obsidian, from square S10-R1, depth 4 to 8"; (E) #299, obsidian, from square N2-R2, depth 8 to 12"; (F) #537, obsidian, from square S47-L6, depth 8 to 12"; (G) #565, obsidian, from square S3-R1, depth 4 to 8".

and 41 are miscellaneous fragments. One specimen, a midsection fragment from level 3 (8 to 12"), is made of flint. It does not show striations, as on the obsidian, but is worn in the same area and was used for the same purpose. All other specimens are made of obsidian.

The distribution according to depth is shown in Table 13. The specimens are most abundant in the upper levels, and none were found in levels 5 or 6. The horizontal distribution according to depth is shown in Figure 60. The striated scrapers are more abundant at the southern end of the excavations, particularly in levels 3 and 4. This distribution resembles that of the concave flake scrapers previously discussed.

Concave Scraper-burin Cores

There are 64 artifacts that are designated as concave scraper-burin cores. Although an awkward designation, it attempts to describe the nature of the artifact. In first working over the El Inga material, most of these specimens were thought to be broken scrapers; however, with more careful examination and study of individual examples, they proved to represent burins or burin cores for the production of burin spalls. The manufacturing process is quite clear as examples are available illustrating all stages of production. It is not especially clear, however, as to whether the burin end or the burin spall represents the desired product. Some burins show use as a chisel-like instrument where minute flakes have been broken from the cutting edge. Also, some of the burin spalls show, by the presence of striations or chipped edges, that they were used as a scraping tool. Obviously, both the burin and the burin spalls were utilized.

As an aid in describing this distinctive artifact, a series of idealized drawings is shown in Figure 61. This illustrates the prepared concave end core, the removal of primary and secondary burin spalls, and the final exhausted nucleus.

The El Inga specimens vary considerably in

Table 13. Vertical distribution of striated scrapers.

Depth in inches	Striated scrapers
0 to 4	18
4 to 8	35
8 to 12	24
12 to 16	5
16 to 20	0
20 to 24	0
Total	82

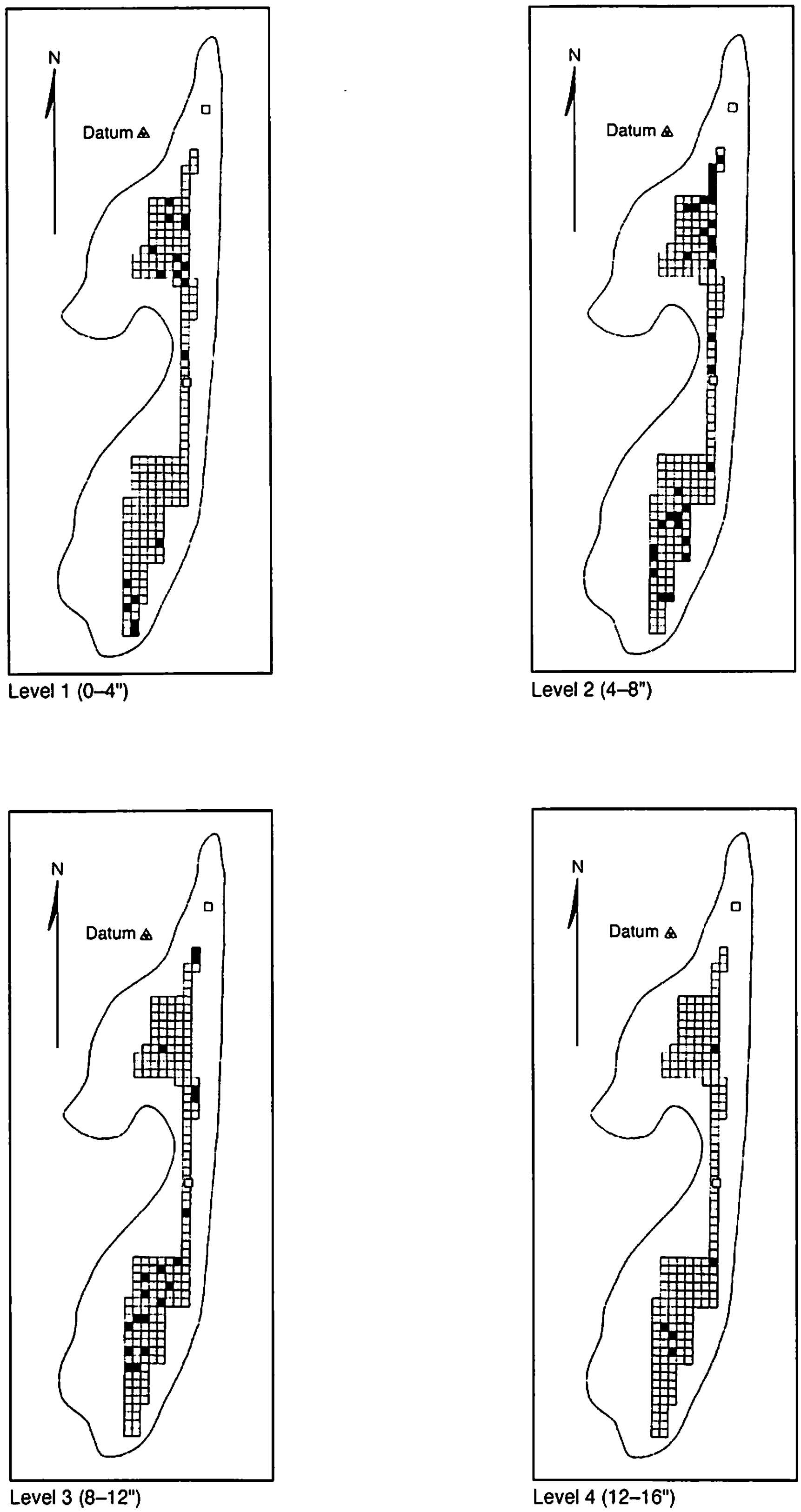


Figure 60. Distribution of striated scrapers by level.

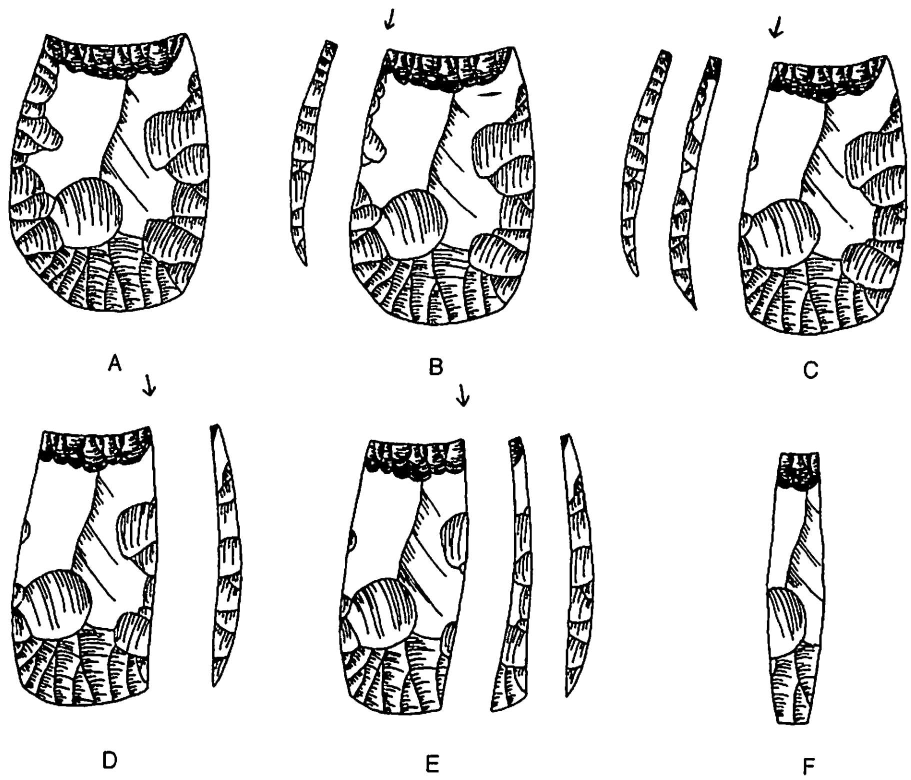


Figure 61. Idealized sketch to show continuous production of burin spalls from a concave scraper-burin core (arrows indicate burin blows): (A) concave scraper-burin core; (B) concave scraper-burin core with primary burin spall removed from the left side; (C) concave scraper-burin core with secondary burin spall removed from the left side; (D) concave scraper-burin core with primary burin spall removed from the right side; (E) concave scraper-burin core with secondary burin spall removed from the right side; (F) exhausted concave scraper-burin core after removal of burin spalls from both sides.

form and the amount of preparation or trimming. A large flake was selected, and a thick one seems to have been preferred although thin examples were used. The end was then retouched to produce a concave area with steep short flakes forming a flattened or truncated area which functioned as a striking platform for the removal of burin spalls. The rest of the flake was partly shaped in most cases; however, it varies from lightly chipped edges to those in which the whole surface has been flaked to resemble an ovate plano-convex scraper. A burin blow was then applied to the concave end or truncation to remove a primary burin spall. These have been removed from both sides of the truncation although they are most commonly taken only from the thickest edge. Later, additional burin spalls or secondary burin spalls were removed until the core could no longer be used. In some cases, burin spalls were removed from both ends of the core. Examples illustrating various forms of concave scraper-burin cores are shown in Figures 62 and 63. The primary and secondary burin spalls derived from these cores are discussed under Burin Spalls.

All of the specimens are made of obsidian, and a number of them have been broken. Complete specimens range between 4.0 and 8.1 cm with most of them falling between 4.0 and 6.0 cm. One specimen displays considerable wear and striations at one corner (Fig. 62C), but this is unique example.

The distribution of concave scraper-burin cores according to depth is shown in Table 14.

Table 14. Verical distribution of concave scraper-burin cores.

Depth in inches	Concave scraper-burin cores
0 to 4	9
4 to 8	14
8 to 12	25
12 to 16	16
16 to 20	0
20 to 24	0
Total	64

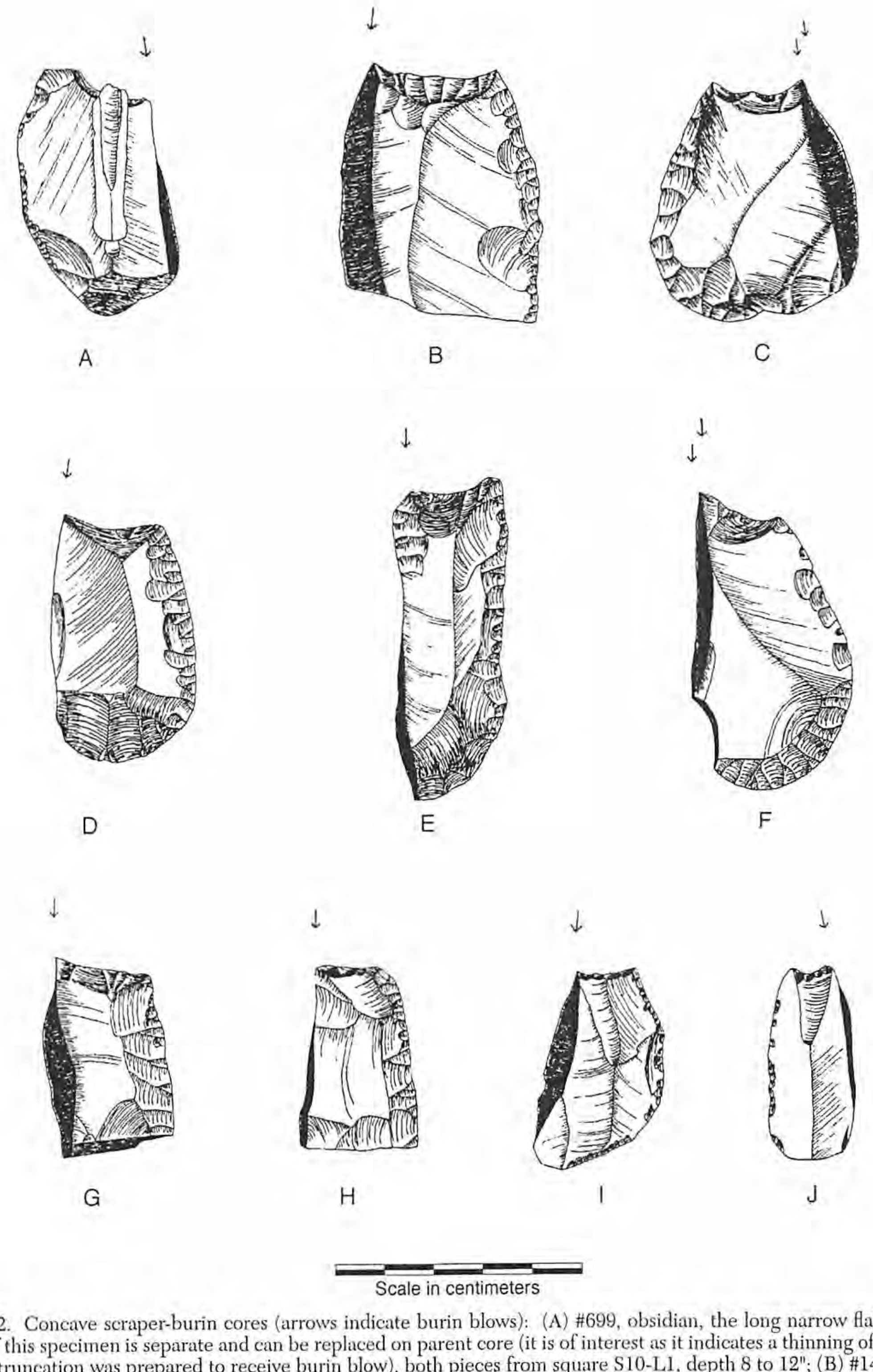


Figure 62. Concave scraper-burin cores (arrows indicate burin blows): (A) #699, obsidian, the long narrow flake shown in center of this specimen is separate and can be replaced on parent core (it is of interest as it indicates a thinning of core before concave truncation was prepared to receive burin blow), both pieces from square S10-L1, depth 8 to 12"; (B) #148, obsidian, from square S12-L2, depth 4.5"; (C) #115, obsidian, striations and abrasions from use appear on upper left corner, from square 0-R1, depth 12.5"; (D) #160, obsidian, from square S44-L2, depth 11"; (E) #604, obsidian, from square S40-L1, depth 8 to 12"; (F) #19, obsidian, from square S10-L2, depth 6"; (G) #224, obsidian, apparently broken, from square S11-L2, depth 4 to 6"; (H) #744, obsidian, apparently broken, from square S10-R1, depth 8 to 12"; (I) #326, obsidian, from square S41-L2, depth 12 to 16"; (J) #443, obsidian, from square S7-L2, depth 0 to 4".

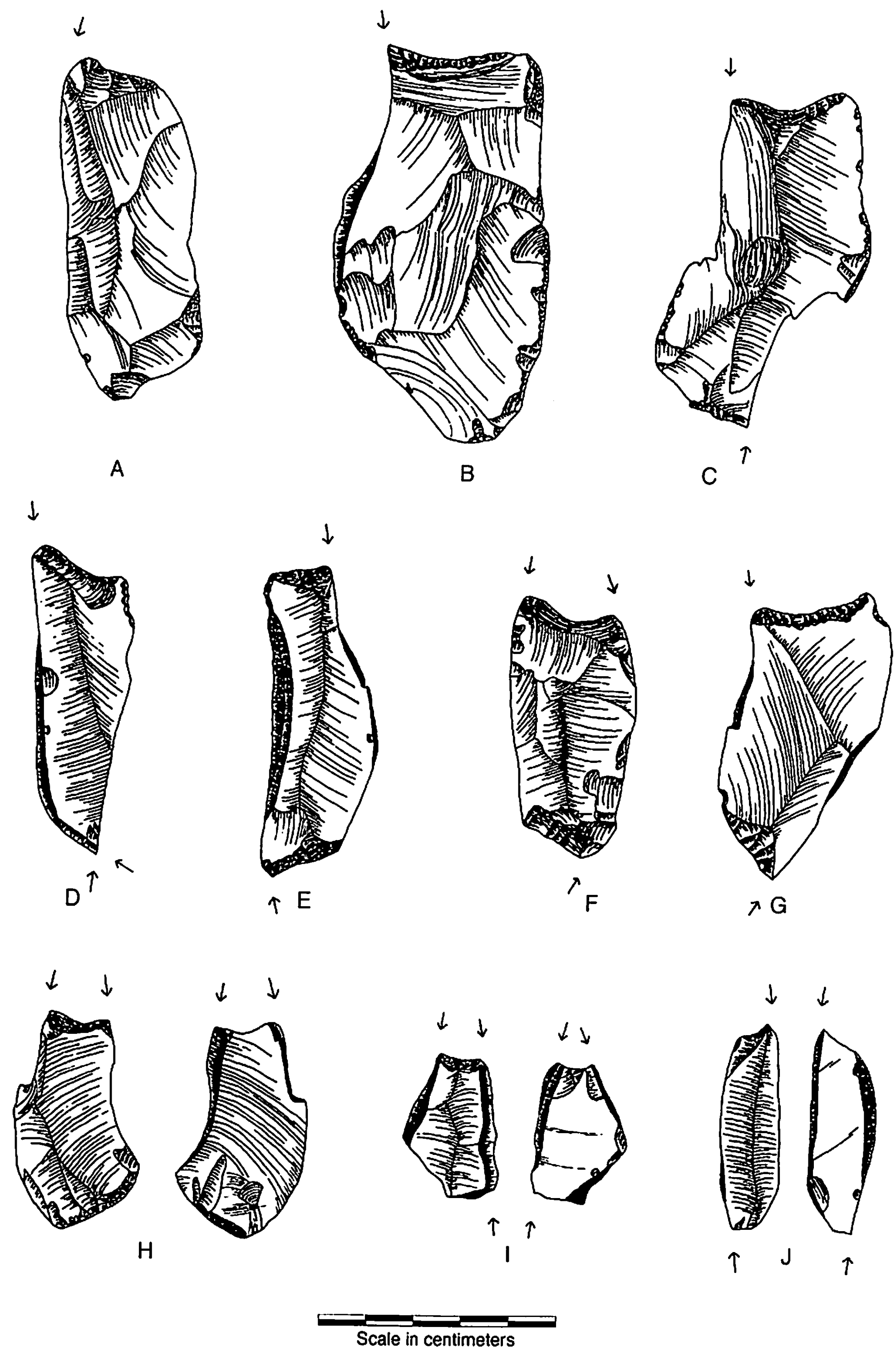


Figure 63. Concave scraper-burin cores (arrows indicate burin blows): (A) #268, obsidian, from square S39-R1, depth 8 to 12"; (B) #801, obsidian, from square S8-L1, depth 8 to 12"; (C) #873, obsidian, from square S5-L3, depth 0 to 4"; (D) #611, obsidian, from square S40-L1, depth 12 to 16"; (E) #821, obsidian, from square S6-R1, depth 8 to 12"; (F) #457, obsidian, from square S52-L4, depth 4 to 8"; (G) #110, obsidian, from square 0-S38, depth 12 to 14"; (H) #444, obsidian, front and back view, from square S7-L2, depth 4 to 8"; (I) #458, obsidian, front and back view, from square S13-L4, depth 0 to 4"; (J) #692, obsidian, front and back view, from square S36-L3, depth 8 to 12".

They are most abundant in level 3 (8 to 12"), and none were found below level 4 (12 to 16").

The horizontal distribution at the various levels is shown in Figure 64. They are more abundant in the south section of the site in level 4, and the general distribution pattern resembles that of the striated scrapers which are sometimes marked by burin facets.

Burins

There is a total of 69 burins from the El Inga excavations. All of them are made from obsidian except one specimen made of flint found in level 2 (4 to 8"). Some of them are apparently broken although irregular or broken pieces of obsidian were used for burins, and it is not always possible to tell if the specimen is broken or if it was produced from a broken flake. Some of the burin edges appear to have been used, for minute flakes have dulled the cutting edge; others appear sharp and unworn. The length ranges from 1.9 to 8.2 cm with most examples falling between 3.0 and 4.0 cm.

The burins appear in several forms although the differences do not appear to be significant in terms of site distribution, either vertically or horizontally. Consequently, all burins are grouped together on tables or figures showing their distribution. There are basically three varieties of burins represented: an angle burin made upon a break, an angle burin made upon a prepared platform or truncation, and dihedral angle burins. Examples of El Inga burins are illustrated in Figures 65 and 66.

There are 45 examples of angle burins made on a break, and these represent the most common variety. In this type the flat surface provided by a break served as the striking platform for removal of the burin spall. The burin spall was most commonly removed from the thickest edge of the flake, but some examples are present in which burin spalls have been removed from both edges or even both ends. Some of the specimens are made from unmodified flakes while others are produced on pieces of flake scrapers or other artifacts. Examples of angle burins made upon a break are shown in Figure 65.

There are 17 angle burins in which the burin facet has been struck from a steeply chipped retouched edge or truncation (Fig. 66A–G). This retouching apparently served to prepare the striking platform for removal of the burin spall. Most specimens have burin spalls removed from one edge only although both ends and sides of the flake were sometimes utilized.

Table 15. Verical distribution of burins.

Depth in inches	Burins
0 to 4	11
4 to 8	16
8 to 12	22
12 to 16	17
16 to 20	2
20 to 24	1
Total	69

The dihedral angle burins are represented by seven specimens. In this form the burin edge is formed by the intersection of two burin facets at an acute angle to produce a V-shaped cutting edge. Examples of dihedral angle burins are shown in Figure 66J–M.

The distribution of burins according to the various levels in the site is shown in Table 15. They are most abundant in level 3 (8 to 12") but are plentiful in all of the top four levels. Three specimens occur at greater depths and are from the deepest section of the site. The horizontal distribution of burins according to the various levels is shown in Figure 67. They appear in all sections of the excavation but are concentrated in the southern area in level 4 (12 to 16").

Primary Burin Spalls

Primary burin spalls are represented by a total of 293 specimens, all made of obsidian. This count includes both whole specimens and fragments. The primary burin spall represents the first flake struck off by a burin blow; consequently, it is a long narrow flake that is triangular in cross section. The burin facet is evident on one face and this shows which side was removed from the burin core. In the series from El Inga, most of the primary burin spalls were apparently removed from concave scraper-burin cores, for they display the prepared striking platform and retouching along the edge. Out of the 293 specimens, only 25 examples lack the retouching along the edge; these are apparently from ordinary angle burins in which the original flake was unworked at the time the burin spall was removed. Among the worked specimens many show the corner of the prepared concave truncation along with the trimmed edge as illustrated in the idealized drawing in Figure 61B. Other whole specimens have such a small striking platform that it is not known as to whether the burin spall was taken from a break or a prepared truncation. The secondary trimming along the edge, however, suggests that they were derived from

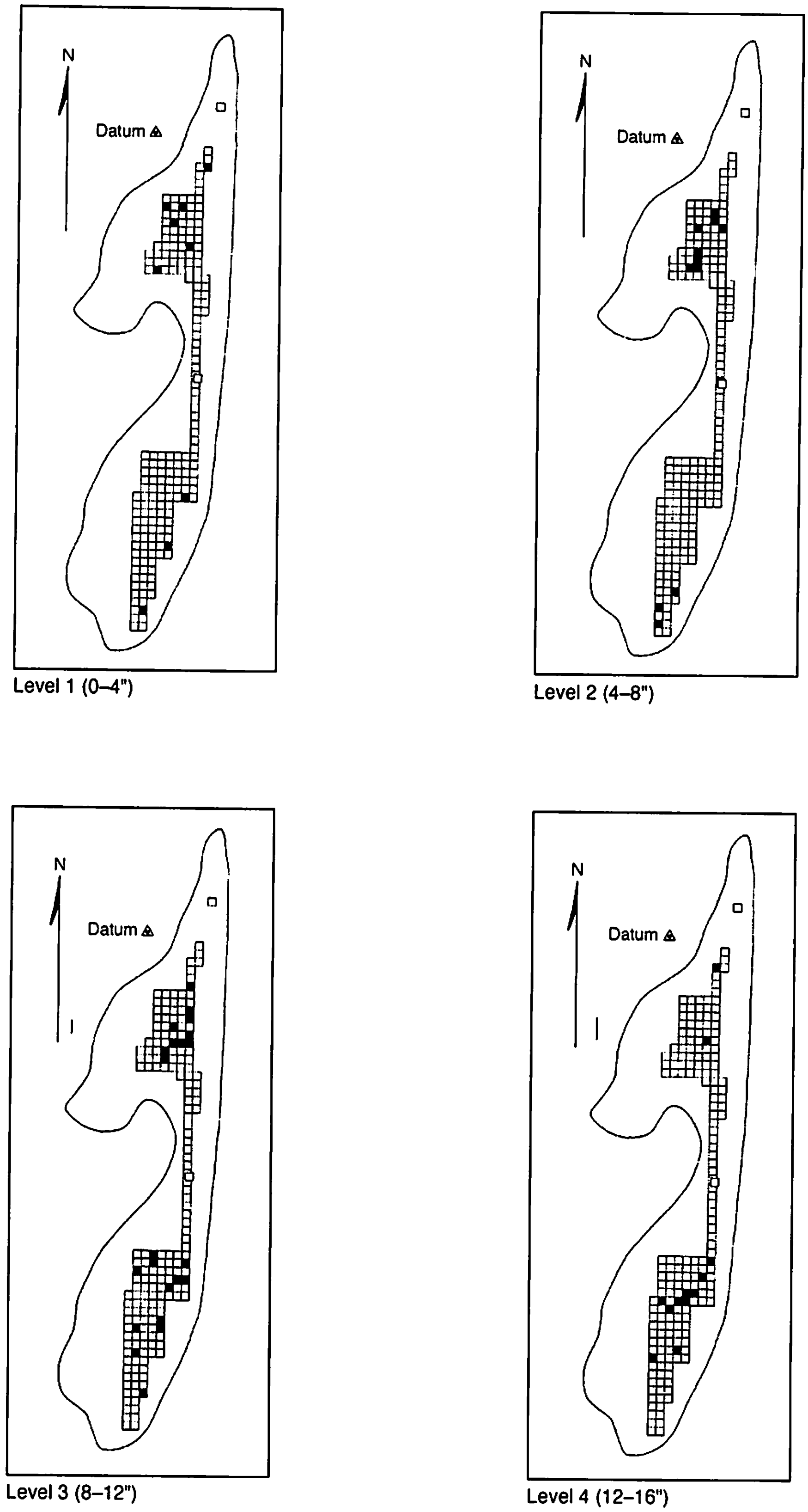


Figure 64. Distribution of concave scraper-burin cores by level.

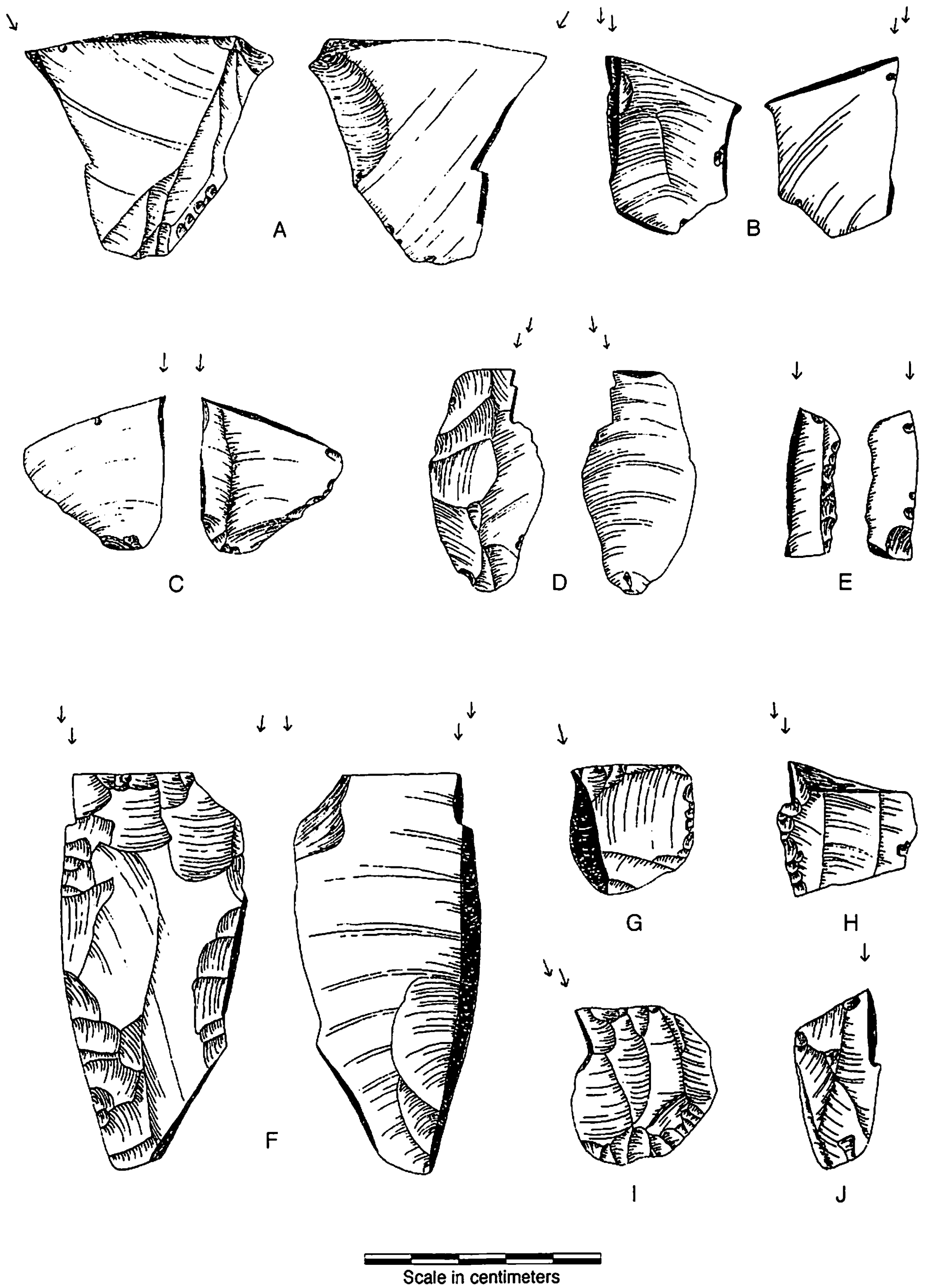


Figure 65. Angle burins (front and back views shown on A-F; arrows show direction of burin blows): (A) #757, obsidian, from square S46-L4, depth 12 to 16"; (B) #111, obsidian, from control strips of Stratigraphic Block #1, depth 10 to 12"; (C) #227, obsidian, from square S11-L2, depth 10 to 12"; (D) #740, obsidian, from square S45-L4, depth 12 to 16"; (E) #342, obsidian, from square S28-R1, depth 4 to 8"; (F) #693, obsidian, from square S40-R1, depth 8 to 12"; (G) #31, obsidian, from square 0-S37, depth 12 to 14"; (H) #787, obsidian, from square S48-L3, depth 4 to 8"; (I) #662, obsidian, from square S42-L4, depth 12 to 16"; (J) #581, obsidian, from square S45-L3, depth 12 to 16".

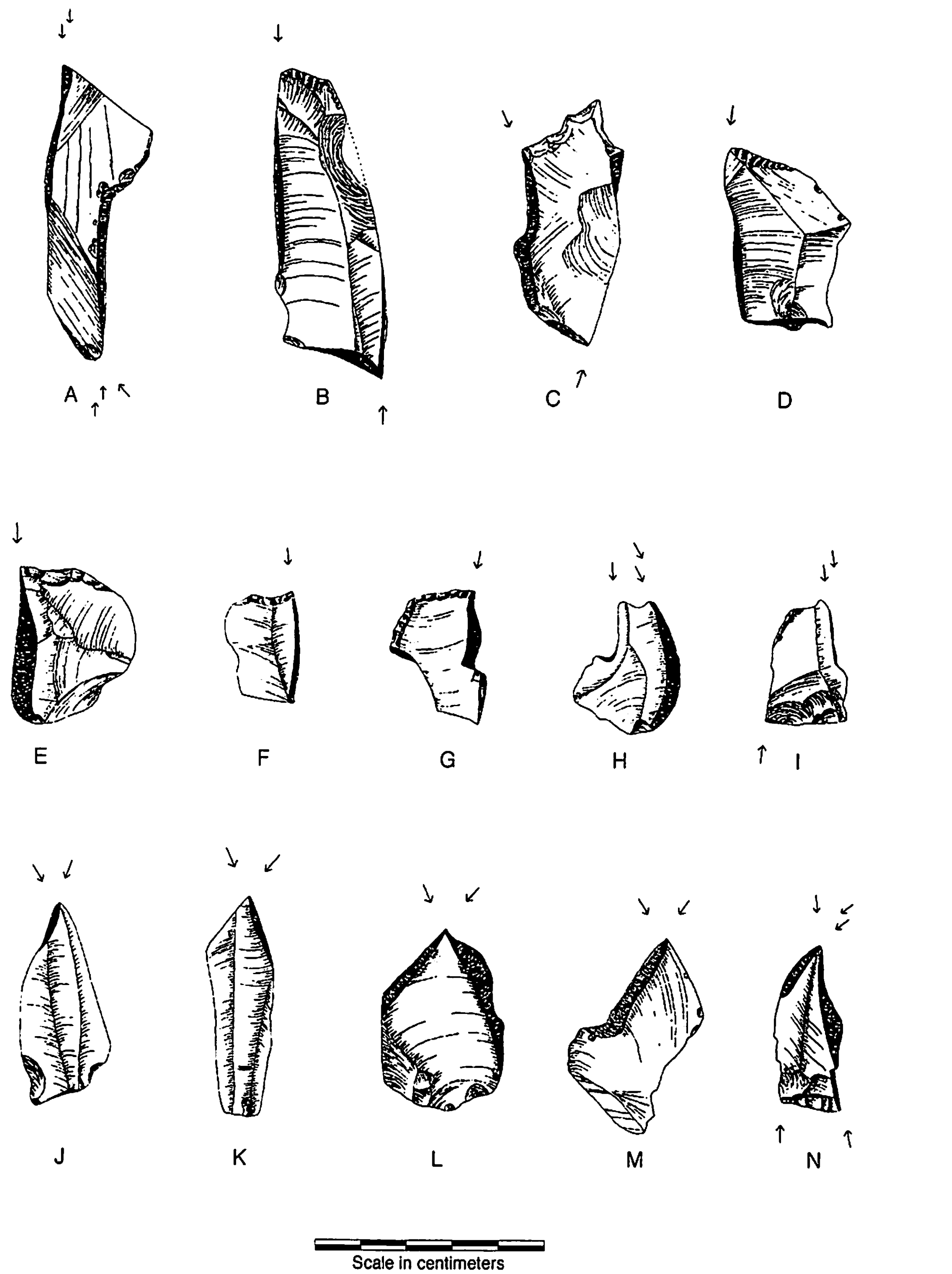


Figure 66. Burins (arrows indicate direction of burin blows): (A) #627, obsidian, from square S48-L6, depth 12 to 16"; (B) #233, obsidian, damaged in excavation, from square S12-L2, depth 18 to 20", Stratigraphic Block #3; (C) #763, obsidian, from square 0-S39, depth 8 to 12"; (D) #740, obsidian, from square S45-L4, depth 12 to 16"; (E) #627, obsidian, from square S48-L6, depth 12 to 16"; (F) #565, obsidian, from square S3-R1, depth 4 to 8"; (G) #620, obsidian, from square Test Pit 1B, depth 4 to 8"; (H) #306, obsidian, from square S40-L3, depth 8 to 12"; (I) #721, obsidian, from square S4-L3, depth 0 to 4"; (J) #282, obsidian, from square S37-L4, depth 8 to 12"; (K) #789, obsidian, from square Test Pit 2B, depth 4 to 8"; (L) #211, obsidian, from square S11-L1, depth 6 to 8", Stratigraphic Block #3; (M) #559, obsidian, from square S47-L3, depth 12 to 16"; (N) #322, obsidian, from square S16-R1, depth 4 to 8".

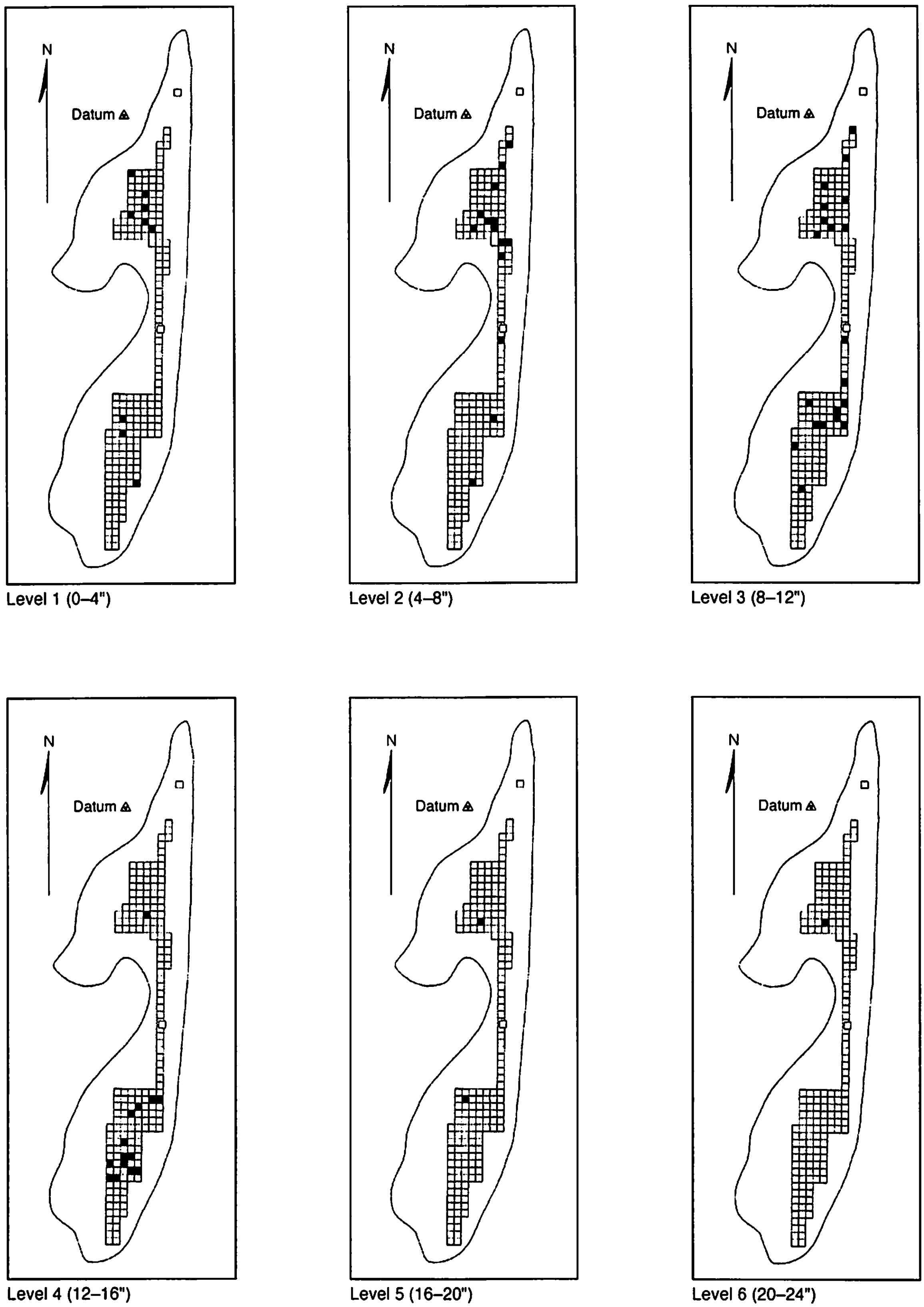


Figure 67. Distribution of burins by level.

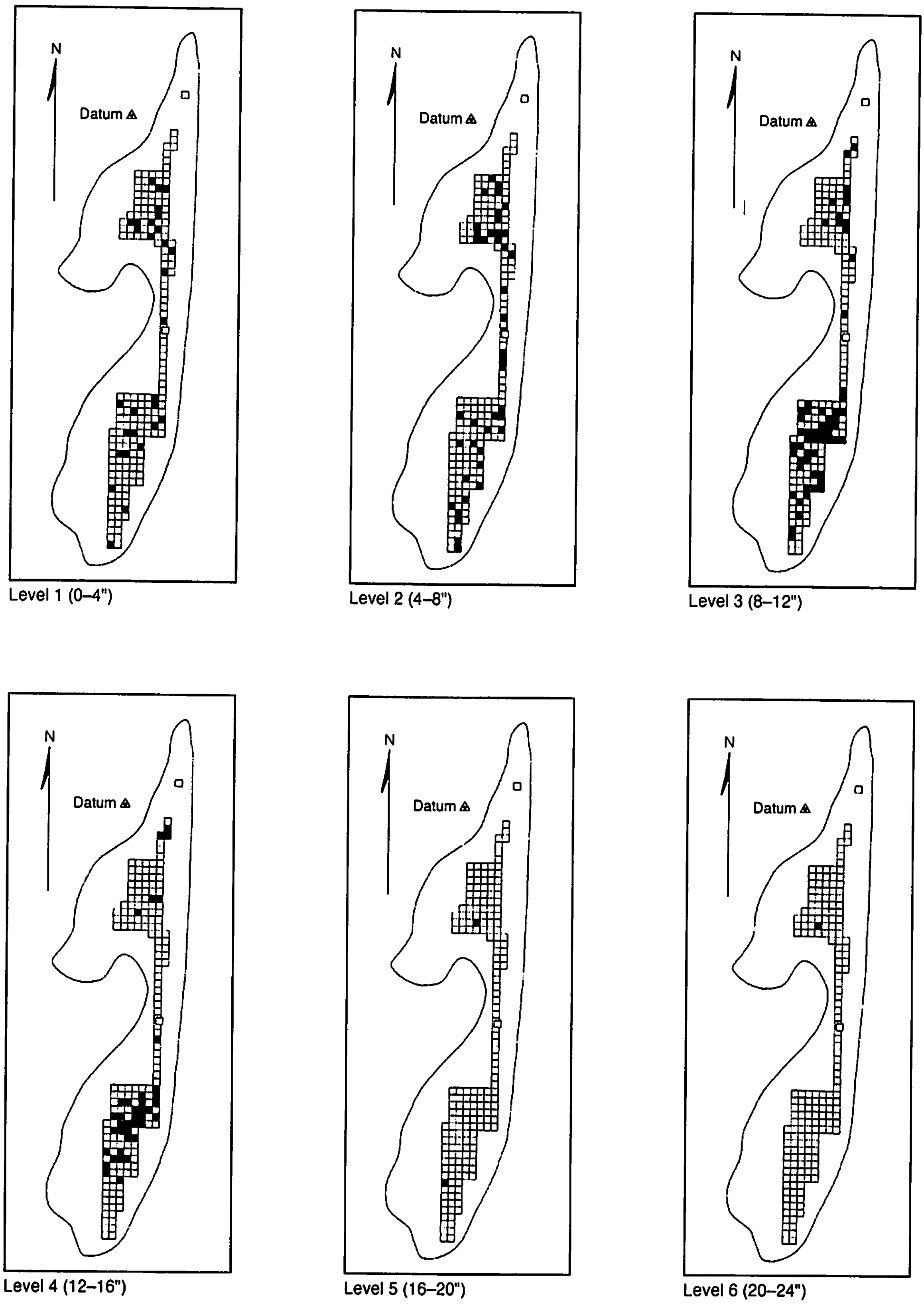


Figure 68. Distribution of primary burin spalls by level.

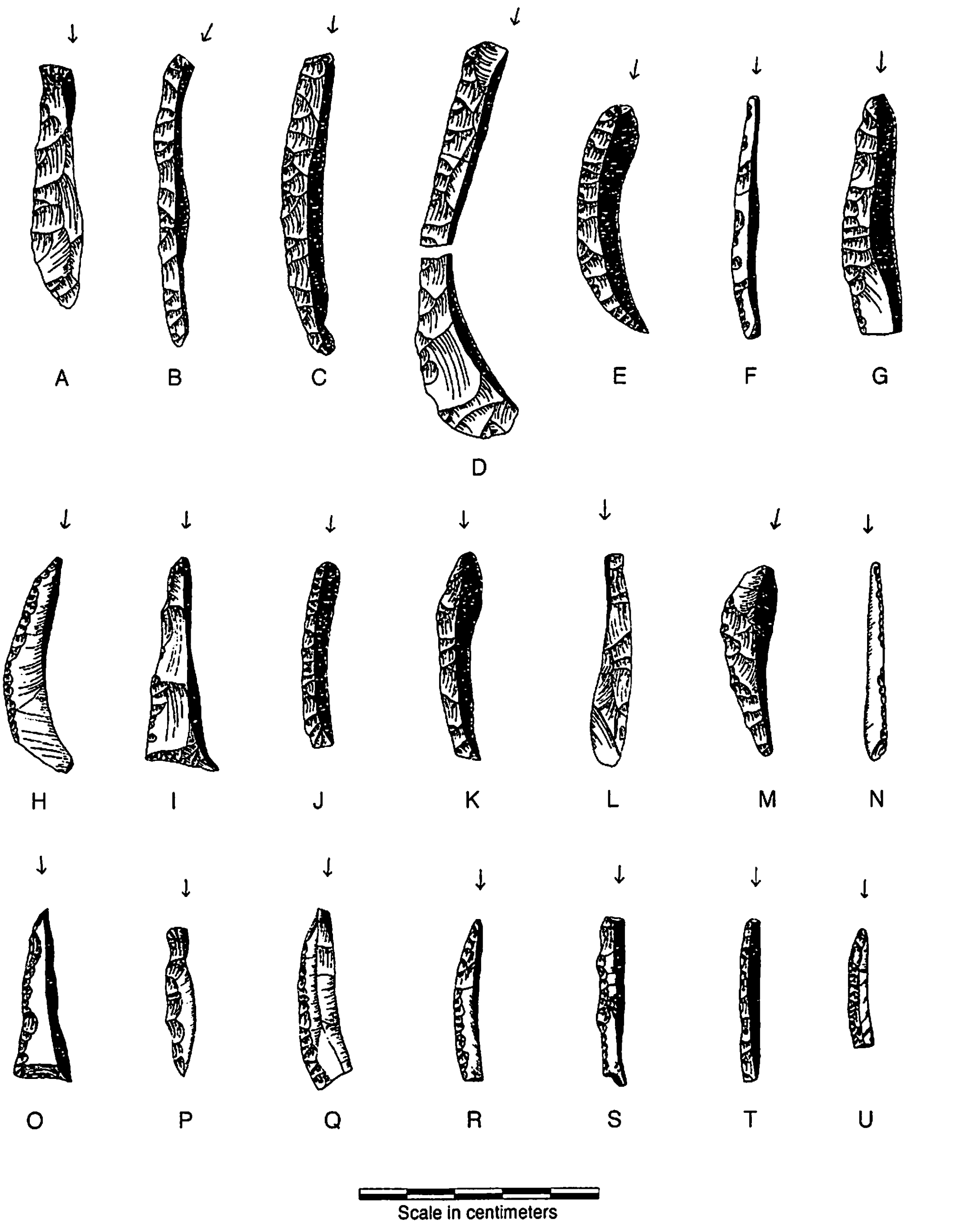


Figure 69. Primary burin spalls (arrows indicate direction of burin blows): (A) #672, obsidian, from square S55-L6, depth 8 to 12"; (B) #286, obsidian, from square S36-R1, depth 12 to 16"; (C) #110, obsidian, from square 0-S38, depth 12 to 14"; (D) discovered in three fragments and restored in laboratory, obsidian (top fragment #803 from square S44-L5, depth 12 to 16"; midsection, #523, from square S42-L6, depth 8 to 12"; lower section, #599, from square S47-L2, depth 8 to 12"); (E) #662, obsidian, from square S42-L4, depth 12 to 16"; (F) #781, obsidian, from square S40-L2, depth 8 to 12"; (G) #286, obsidian, from square S36-R1, depth 12 to 16"; (H) #734, obsidian, from square S40-L4, depth 8 to 12"; (I) #730, obsidian, from square S37-R1, depth 12 to 16"; (J) #289, obsidian, from square S7-L1, depth 8 to 12"; (K) #747, obsidian, from square S48-L3, depth 8 to 12"; (L) #641, obsidian, from square S41-L1, depth 12 to 16"; (M) #611, obsidian, from square S40-L1, depth 12 to 16"; (O) #280, obsidian, from square S39-L2, depth 12 to 16"; (P) #797, obsidian, from square S38-L4, depth 12 to 16"; (Q) #641, obsidian, broken, from square S41-L1, depth 12 to 16"; (R) #415, obsidian, broken, from square S43-L2, depth 12 to 16"; (S) #395, obsidian, broken, from square 0-S9, depth 0 to 4"; (T) #328, obsidian, broken, from square S13-L2, depth 4 to 8"; (U) #807, obsidian, broken, from square S44-L5, depth 8 to 12".

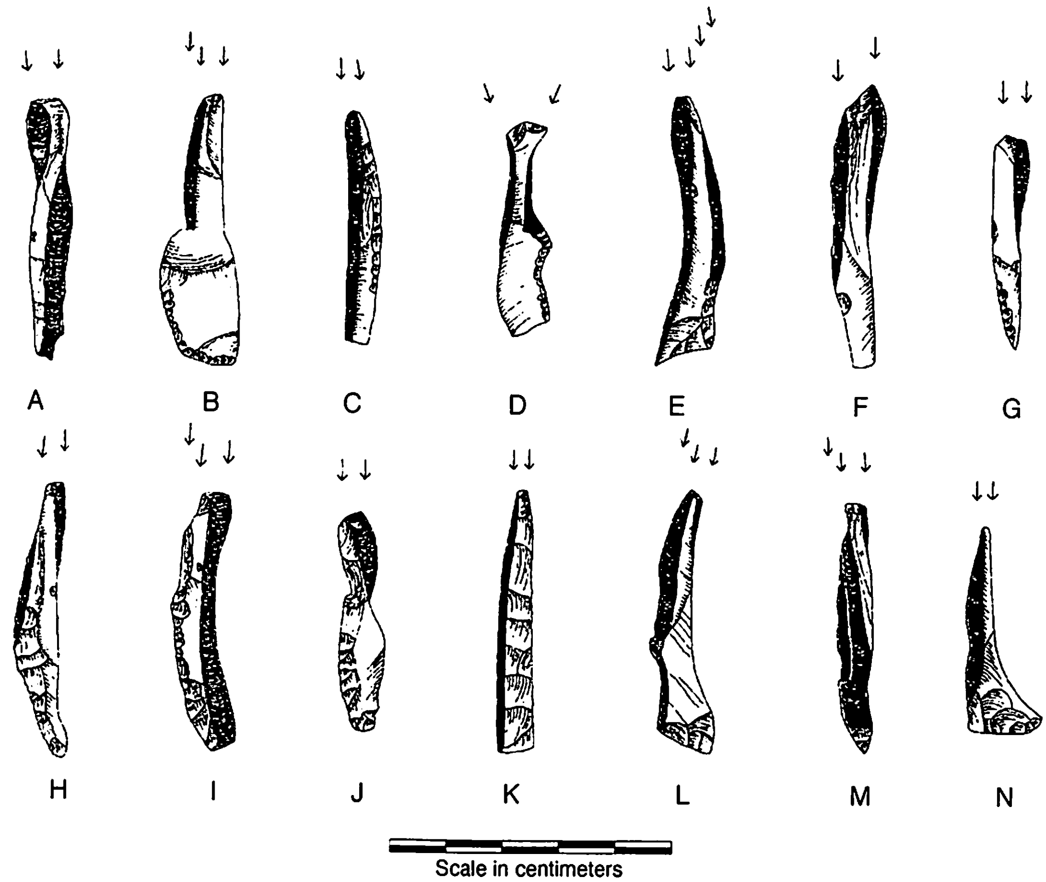


Figure 70. Secondary burin spalls (arrows indicate direction of burin blows): (A) #606, obsidian, from square 0-R2, depth 12 to 16"; (B) #730, obsidian, from square S37-R1, depth 12 to 16"; (C) #455, obsidian, from square S56-L6, depth 8 to 12"; (D) #499, obsidian, from square S2-R1, depth 8 to 12"; (E) #288, obsidian, from square S7-L1, depth 4 to 8"; (F) #109, obsidian, from square 0-S38, depth 10 to 12"; (G) #721, obsidian, from square S4-L3, depth 0"to 4"; (H) #744, obsidian, from square S10-R1, depth 8 to 12"; (I) #282, obsidian, from square S37-L4, depth 8 to 12"; (J) #298, obsidian, from square S44-L2, depth 8 to 12"; (K) #280, obsidian, from square S39-L2, depth 12 to 16"; (L) #148, obsidian, from square S12-L2, depth 4.5"; (M) #352, obsidian, from square 0-S8, depth 4 to 8"; (N) #30, obsidian, from square 0-S37, depth 10 to 12".

concave scraper-burin cores. A number of specimens are broken, and the area of the striking platform is missing.

An effort was made to discover a primary burin spall which could be replaced upon the original concave scraper-burin core from which it had been removed, but this has been unsuccessful. One primary burin spall could be matched with a secondary burin spall (Fig. 71A), but the whole artifact could not be reassembled. The matched spalls, however, are obviously derived from a concave scraper-burin core.

It is not clear as to whether the primary burin spalls are refuse material from manufacturing burins, or whether the burin spall was desired for some purpose. The retouching present along the edge is derived from the burin core from which the burin spall was struck, and very few specimens show any indication of use after removal. In four examples, however, the burin facet shows slight striations or scratches to indicate some usage, but this is rare.

Examples of primary burin spalls from El Inga are illustrated in Figure 69. The specimens range in length from 1.3 to 6.7 cm, most of them falling between 2.0 and 4.0 cm. Many of the specimens have a slight curve or are slightly twisted where the burin blow did not produce a straight, flat spall.

The distribution of primary burin spalls according to their depth at the site is given in Table 16. They are most abundant in level 3 with only three examples deeper that level 4. The horizontal distribution according to the various levels

Table 16. Vertical distribution of primary burin spalls.

Depth in inches	Primary burin spalls
0 to 4	40
4 to 8	54
8 to 12	110
12 to 16	86
16 to 20	2
20 to 24	1
Total	293

Table 17. Vertical distribution of secondary burin spalls.

Depth in inches	Secondary burin spalls
0 to 4	35
4 to 8	59
8 to 12	149
12 to 16	103
16 to 20	5
20 to 24	0
Total	351

is shown in Figure 68. The primary burin spalls are much more abundant at the southern end of the excavations in levels 3 and 4.

Secondary Burin Spalls

There are 351 secondary burin spalls from the excavations at El Inga. All are made of obsidian except for a single exception made of flint. These include broken examples as well as complete specimens. The secondary burin spall is represented by a long narrow flake struck from a burin by a secondary burin blow. The removal of a primary burin spall creates the initial burin cutting edge while the removal of the secondary burin spall functions to resharpen the burin by producing a new burin edge. The secondary burin spall tends to be rectangular in cross section, displaying on one face the burin facet from which the primary burin spall was removed, and on the opposite side, the secondary burin facet. Obviously, a continued resharpening of the burin will produce a number of burin spalls, but as these are generally indistinguishable one from the other, all will be considered as secondary burin spalls. An example of the secondary burin spall and its removal from the burin core is shown in Figure 61C.

Most of the specimens from El Inga appear to have been taken from concave scraper-burin cores. This is indicated by the steeply chipped truncation at the striking platform as well as the remaining retouched edges which were not removed by the primary burin spall. Examples of secondary burin spalls from El Inga are illustrated in Figures 70 and 71.

The specimens range from 1.7 to 8.0 cm in length with many of the unbroken spalls falling between 5.0 and 6.0 cm. The thickness of the spalls varies considerably; some are thin, no more than 0.1 cm in thickness, while others are thick and more massive. Occasionally, the burin blow would curve so that a large amount of the burin core was removed as part of the secondary burin spall. Also, many of the burin facets are not flat but curved and produce a twist in the resulting spall. A few specimens have a striking platform area that is partly battered, indicating unsuccessful burin blows and occasional difficulty in removing the burin spall.

Many of the secondary burin spalls would serve as useful tools, and some of them show striations or indications of having been used as a scraper. The evidence of use is present upon the burin facet which could only appear after the spall has been removed from the parent core. An examination of the primary burin edge which is present on the striking platform of the secondary burin spall shows wear and chip removal through usage as a burin. Although the spalls were frequently utilized, their removal was apparently primarily for the purpose of resharpening the burin edge.

The site distribution of secondary burin spalls according to depth is shown in Table 17. They are most abundant in level 3 although five examples appear in level 5. The horizontal distribution according to the various levels is shown in Figure 72. As would be expected, the distribution is similar to that of the primary burin spalls and the concave scraper-burin cores.

Perforators

There are 39 obsidian artifacts classed as perforators, and several examples are illustrated in Figure 73. One specimen, Figure 73A, is bifacially flaked in the manner of the projectile points, but all other examples are made from irregular flakes and have only a small amount of secondary chipping to shape the perforator tip. There are two varieties of perforators, one (29 examples) in which the tip forms a sharp needle like projection and would produce a puncture type hole (Fig. 73C); and the other (10 examples) in which the tip is not pointed but chisel-like and would produce a slot or slit type hole (Fig. 73K). In the latter variety, the unmodified thin flake edge serves as the chisel-like cutting edge.

The specimens are generally small in size, the

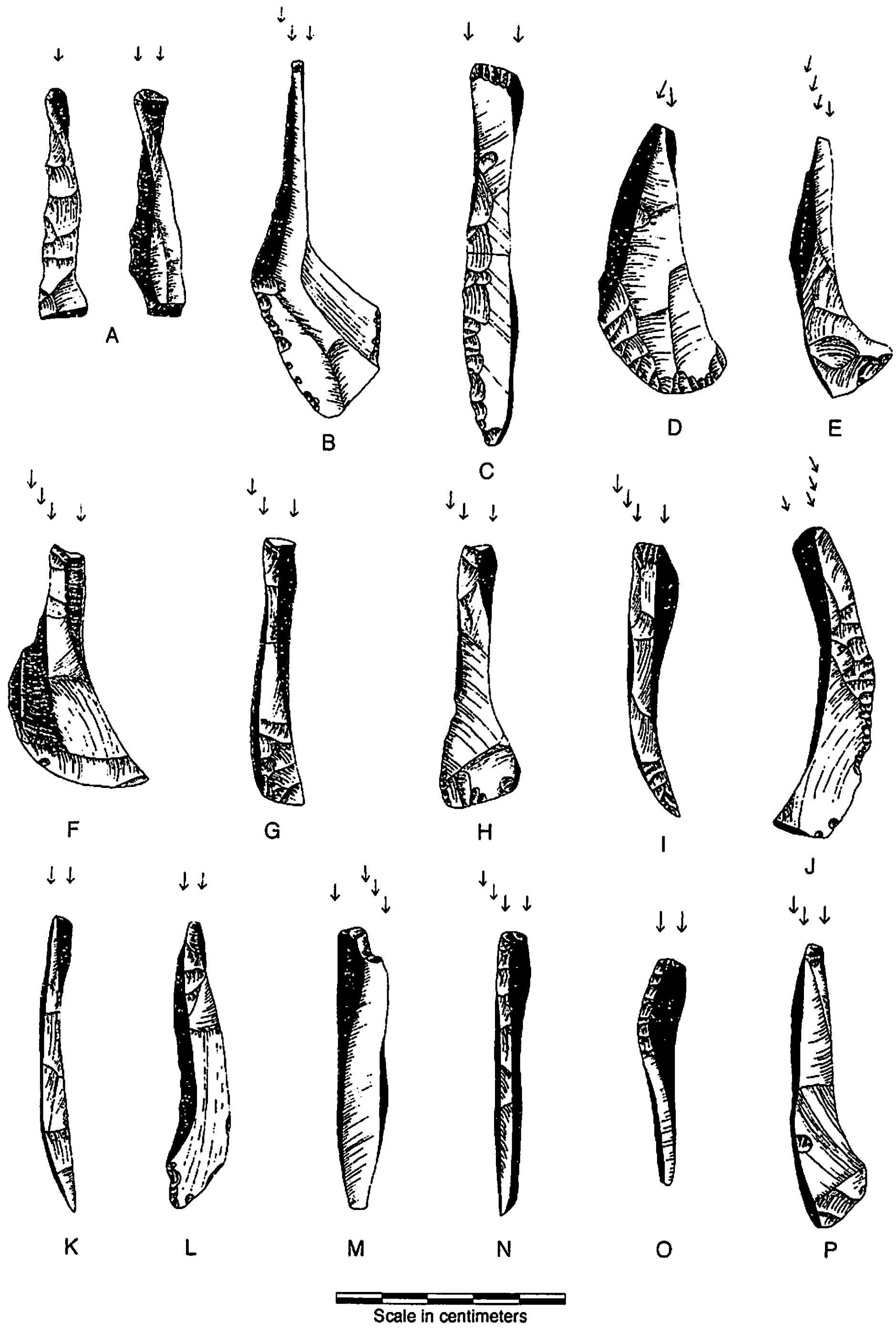


Figure 71. Secondary burin spalls (arrows indicate direction of burin blows): (A) #665, obsidian, two burin spalls, one primary spall and one secondary spall that fit together and were derived from a single burin core, from square S12-L3, depth 4 to 8"; (B) #821, obsidian, from square S6-R1, depth 8 to 12"; (C) #406, obsidian, two pieces of a single burin spall, aboriginal break, from square S11-L3, depth 4 to 8"; (D) #504, obsidian, from square S4-R1, depth 12 to 16"; (E) #641, obsidian, from square S41-L1, depth 12 to 16"; (F) #286, obsidian, from square S36-R1, depth 12 to 16"; (G) #420, obsidian, from square S39-L3, depth 8 to 12"; (H) #44, obsidian, from square S38-L1, depth 12 to 14"; (I) #732, obsidian, from square S41-L3, depth 12 to 16"; (J) #821, obsidian, from square S6-R1, depth 8 to 12"; (K) #611, obsidian, from square S40-L1, depth 12 to 16"; (L) #110, obsidian, from square 0-S38, depth 12 to 14"; (M) #821, obsidian, from square S6-R1, depth 8 to 12"; (N) #216, obsidian, from square S12-L1, depth 8 to 10"; (O) #853, obsidian, from square S38-R1, depth 12 to 16"; (P) #30, obsidian, from square 0-S37, depth 10 to 12".

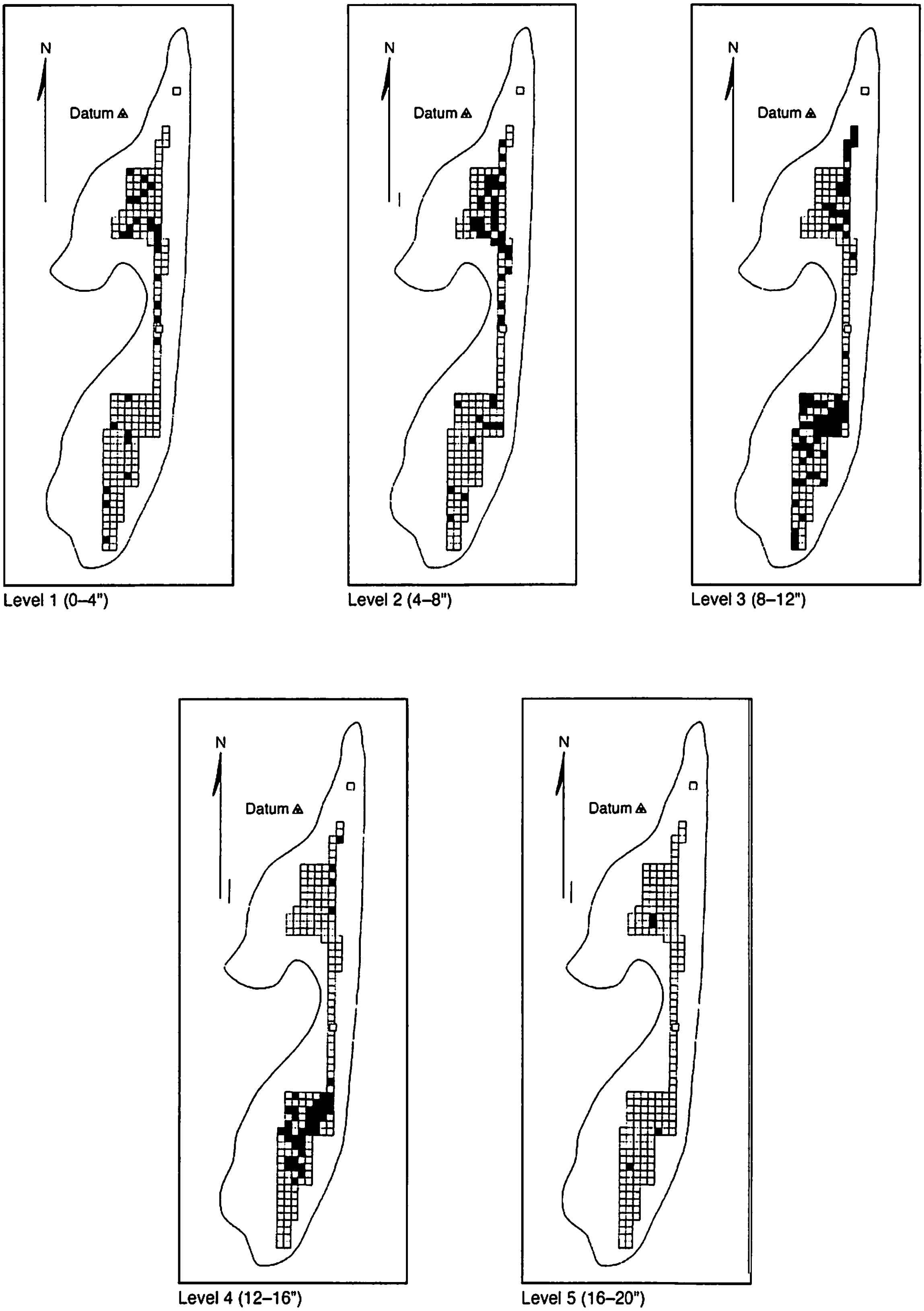


Figure 72. Distribution of secondary burin spalls by level.

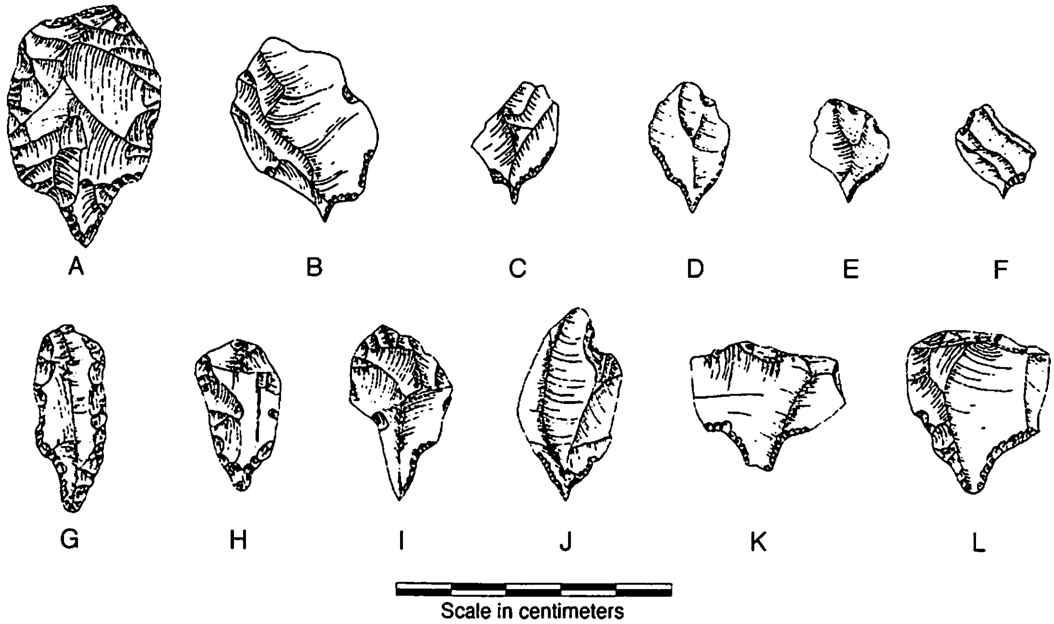


Figure 73. Perforators: (A) #58, obsidian, from square S13-R1, depth 8 to 12"; (B) #721, obsidian, from square S4-L3, depth 0 to 4"; (C) #279, obsidian, from square S23-R1, depth 4 to 8"; (D) #292, obsidian, from square S18-R2, depth 4 to 8"; (E) #826, obsidian, from square S10-L3, depth 4 to 8"; (F) #604, obsidian, from square S40-L1, depth 8 to 12"; (G) #773, obsidian, from square S13-L1, depth 0 to 4"; (H) #499, obsidian, from square S2-R1, depth 8 to 12"; (I) #525, obsidian, from square S52-L5, depth 0 to 4"; (J) #219, obsidian, from square S12-L1, depth 16 to 18"; (K) #773, obsidian, from square S13-L1, depth 0 to 4"; (L) #703, obsidian, from square S46-L3, depth 12 to 16".

maximum length ranging from 1.5 to 4.5 cm. The perforating tip is short, thin, and fragile so that it would be useful only in perforating soft materials or for engraving. Specimens of both varieties occasionally display damage at the tips as if from usage.

The distribution of perforators at El Inga according to the various levels is shown in Table 18. Their distribution in various sections of the site according to the various levels is shown in Figure 74. There appear to be no differences between the two varieties in so far as distribution is concerned.

Miscellaneous Items

After sorting all of the above materials, a small number of items remain which do not conveniently fit into the various categories of artifacts or which require some additional comment. There is a total of 171 specimens represented by these miscellaneous items, and, of these, 151 pieces do not appear to have any special importance. These include trimming flakes from the manufacturing process, pseudo burins, battered or irregular pieces of obsidian, discard or reject material containing flaws, and fragments from artifacts that are badly damaged and cannot be identified. The remaining 20 specimens, however, require some comment.

Table 18. Vertical distribution of perforators.

Depth	Perforators
0 to 4	11
4 to 8	12
8 to 12	12
12 to 16	3
16 to 20	1
20 to 24	0
Total	39

These latter specimens include 5 bifaces, 1 small core, 7 abraded flakes, 2 slot-cutters, 4 basalt scrapers, and 1 basalt chisel. Several of these specimens are illustrated in Figures 76 and 77.

There are five obsidian specimens that are flaked upon both surfaces. Two specimens (Fig. 76A–B) are similar to the plano-convex scrapers discussed earlier except that the flat side has been flaked. One specimen (Fig. 76B) appears to be the broken end from one of the keeled elliptical, plano-convex scrapers. The remaining three bifaces are thick and crudely worked, possibly unfinished knives or scrapers. These are illustrated in Figure 76C–E.

There is one small and poorly worked obsidian

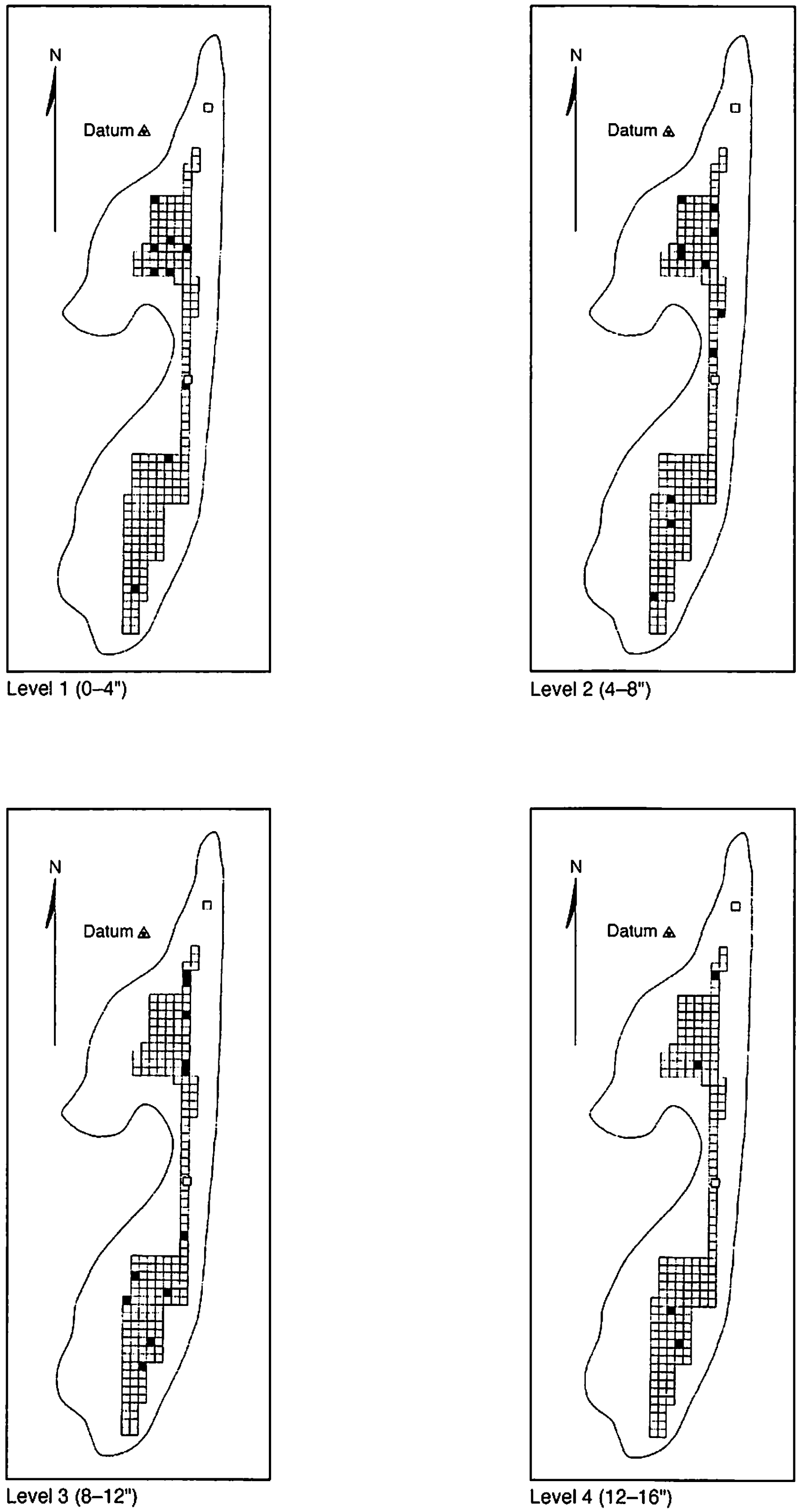


Figure 74. Distribution of perforators by level.

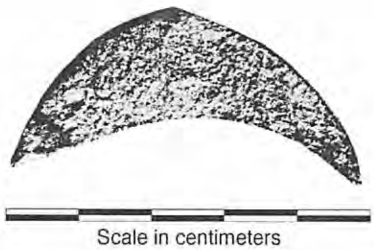


Figure 75. Basalt chisel.

core which has been utilized at each end. Although small and apparently exhausted, it appears to have been used as a source for small blades. The specimen came from square S49-L3, level 3, and is illustrated by four views in Figure 77A.

Seven obsidian flakes show abrasions or striations upon one face or upon a concave edge. Two specimens, apparently sections of flake scrapers, show abrasions upon one surface (Fig. 77B–C). Five specimens are worn and abraded at the edge, possibly from usage in grinding or dulling the sharp edge of a projectile point base. Three examples are illustrated in Figure 77D–F.

Two obsidian flakes have been termed slot-cutters, for they would serve very well for this purpose; both are small flakes with an abraded area on one edge. The flake edge has been used in a back and forth motion similar to that used with a saw or slot-cutter, and the rubbing has abraded the edges of the implement. One specimen (Fig. 77G) has had some of the striations removed by secondary chipping, perhaps to resharpen the dulled edge.

There are four basalt flakes, all under 5.2 cm in length, in which one edge displays wear and polish from use as a scraper. The flakes are unworked otherwise but provided a useful tool without modification.

There is one object designated as a basalt chisel. It is a crescent shaped piece of basalt measuring 4.9 cm in length, 1.6 cm in width and 1.0 cm in thickness. The stone is naturally shaped, apparently by thermal fractures, but each end of the crescent tapers to an edge rather like an incisor tooth (Fig. 75). One end is unworn and somewhat irregular, but the other end tapers to a sharp edge and shows wear on one side from usage as a chisel or graving tool. The specimen came from square O-S11, level 2 (4 to 8").

Stratigraphic Blocks—Artifacts

Although the artifacts found in each of the stratigraphic blocks has been included in the above discussion, it is worthwhile to list the objects found in each of the control blocks separately. An artifact tabulation for the three stratigraphic blocks, as well as a summary of all three, is presented in Tables 19 through 22.

The total number of artifacts from each stratigraphic block is small, and some objects are not represented at all. For example, no ovate or barbed projectile points were found in any of the three blocks.

In general, the distribution of the various artifacts in the stratigraphic blocks resembles that for the entire site. It is also clear that there are differences in the distributions of various artifacts, and some of these will be discussed later. The differences in artifact distributions, in spite of a small sample, suggest that the El Inga assemblage is not a single cultural manifestation, but rather that it is a mixture.

RADIOCARBON DATES

There are five radiocarbon dates that have been obtained for El Inga. Additional samples have been submitted for dating, but the results are not presently available.

The radiocarbon dates available are all based upon an analysis of carbon extracted from soil samples. It was not possible to obtain charcoal in any quantity, and visible flecks of charcoal were rare throughout the excavations. An analysis of soil samples, however, indicated the presence of diffuse carbon in the soil, and consequently numerous samples were collected in the field. These were taken from the various levels in the stratigraphic blocks and in other areas where charcoal was indicated. The following dates are based upon these soil specimens:

Two assays have been run by the Isotopes, Inc., laboratory at 123 Woodlawn Avenue, Westwood, New Jersey (Trautman, 1963):

I-557 4000 ± 190 / 2050 B.C.

El Inga Stratigraphic Block 1, square S37-L1, level 8, depth 14 to 16", collected by R. E. Bell on August 2, 1961.

I-558 5550 ± 200 / 3600 B.C.

El Inga square S13-L2, level 6, depth 20 to 22", collected by R. E. Bell on August 1, 1961.

Three assays have been run through the courtesy of Dr. T. A. Rafter, Director of the Depart-

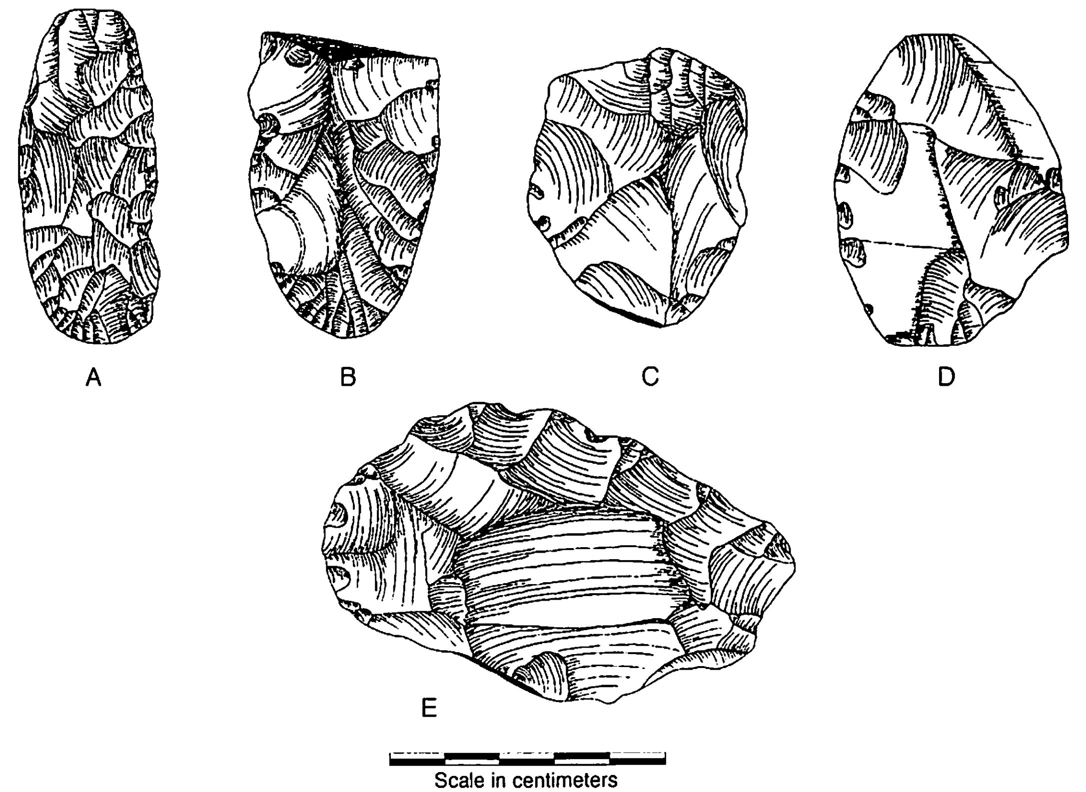


Figure 76. Miscellaneous items: (A) #349, biface, obsidian, from square S13-L2, depth 8 to 12"; (B) #156, biface, obsidian, broken, from square 0-S14, depth 6"; (C) #800, biface, obsidian, from square S8-L1, depth 4 to 8"; (D) #96, biface, obsidian, from square S42-L5, depth 12 to 16"; (E) #80, biface, obsidian, from square S42-L5, depth 12 to 16".

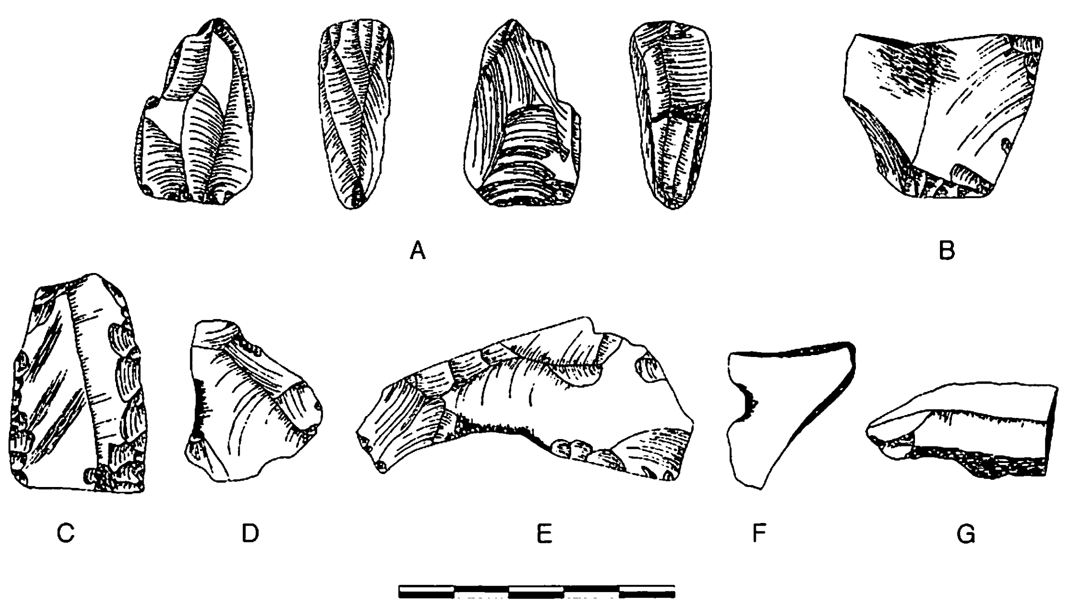


Figure 77. Miscellaneous items: (A) #435, core, obsidian, four views, utilized at both ends, from square S49-L4, depth 8 to 12"; (B) #142, flake with abraded surface, obsidian, from square 0-S6, depth 8 to 10"; (C) #329, abraded flake scraper, obsidian, from square S13-L2, depth 12 to 16"; (D) #667, abraded obsidian flake, from square S19-R1, depth 0 to 4"; (E) #290, abraded obsidian flake, from square S7-L1, depth 12 to 16"; (F) #421, abraded obsidian flake, from square S39-L3, depth 12 to 16"; (G) #608, slot-cutter, obsidian, from square 0-S12, depth 0 to 4".

Table 19. Stratigraphic Block #1.

Depth in inches	Fell's Cave Fish-tail points	Contracting stemmed points	Broad-stemmed points	Ovate points	Barbed points	Unique points	Fragments of points	Hafted stem knives	Bifacial knives	Flake knives	Flake scapers	Concave flake scrapers	Blade-like scrapers	Plano-convex obsidian scrapers	Plano-convex basalt scrapers	Striated scrapers	Concave scraper-burin cores	Burins	Primary burin spalls	Secondary burin spalls	Perforators	Miscellaneous items	Pottery sherds	Total
0 to 2																							14	14
2 to 4											1												9	10
4 to 6																			1				9	10
6 to 8							1				3	1	1						1	2			15	24
8 to 10											1								5				4	10
10 to 12									1	2	7	1		1				1	6	10		4		33
12 to 14									1	6	3						1	1	6	7		2		29
14 to 16	1		1																					0
16 to 18																								0
18 to 20																								0
20 to 22																								0
22 to 24																								0
24 to 26																								0
Total	1	0	1	0	0	0	1	0	2	8	15	2	1	1	0	0	1	2	19	19	0	6	51	130

Table 20. Stratigraphic Block #2.

Depth in inches	Fell's Cave Fish-tail points	Contracting stemmed points	Broad-stemmed points	Ovate points	Barbed points	Unique points	Fragments of points	Hafted stem knives	Bifacial knives	Flake knives	Flake scapers	Concave flake scrapers	Blade-like scrapers	Plano-convex obsidian scrapers	Plano-convex basalt scrapers	Striated scrapers	Concave scraper-burin cores	Burins	Primary burin spalls	Secondary burin spalls	Perforators	Miscellaneous items	Pottery sherds	Total
0 to 2									1		5					1			1	1			42	51
2 to 4											3						1		1	1		1	5	12
4 to 6										5	2					1			1	4		1		14
6 to 8										4	5	1						2	2	4		3		17
8 to 10									1	4	4		1		1		2			2		2		9
10 to 12		1								2	4			1								1		2
12 to 14											2													1
14 to 16							1																	0
16 to 18																								0
18 to 20																								0
20 to 22																								0
22 to 24																								0
24 to 26																								0
Total	0	1	0	0	0	0	1	0	2	15	25	1	1	1	1	2	3	2	5	12	0	8	47	127

Table 21. Stratigraphic Block #3.

Depth in inches	Fell's Cave Fish-tail points	Contracting stemmed points	Broad-stemmed points	Ovate points	Barbed points	Unique points	Fragments of points	Hafted stem knives	Bifacial knives	Flake knives	Flake scapers	Concave flake scrapers	Blade-like scrapers	Plano-convex obsidian scrapers	Plano-convex basalt scrapers	Striated scrapers	Concave scraper-burin cores	Burins	Primary burin spalls	Secondary burin spalls	Perforators	Miscellaneous items	Pottery sherds	Total
0 to 2									1		7				1			2	2	2		2	20	37
2 to 4									2		2								1		1		5	11
4 to 6									1		2	1		2		1	3		1	1				12
6 to 8							1			1	2			1				1		1				7
8 to 10									2		3						1	1		2		1		10
10 to 12						1				2	3						1	1						8
12 to 14									2													1		3
14 to 16	1					1	1		3	2	3		2	4				1	1					19
16 to 18	1						1		6		8		1	3						1	1			22
18 to 20							2		1		2			1	1			1	1	2				11
20 to 22	1						2		1	1	4			4										13
22 to 24	1						1				4							1	1					8
24 to 26													1											1
Total	4	0	0	0	0	2	8	0	19	6	40	1	4	15	2	1	5	8	7	9	2	4	25	162

Table 22. Stratigraphic Blocks #1, #2, and #3 combined.

Depth in inches	Fell's Cave Fish-tail points	Contracting stemmed points	Broad-stemmed points	Ovate points	Barbed points	Unique points	Fragments of points	Hafted stem knives	Bifacial knives	Flake knives	Flake scapers	Concave flake scrapers	Blade-like scrapers	Plano-convex obsidian scrapers	Plano-convex basalt scrapers	Striated scrapers	Concave scraper-burin cores	Burins	Primary burin spalls	Secondary burin spalls	Perforators	Miscellaneous items	Pottery sherds	Total
0 to 2									2		12				1	1		2	3	3		2	76	102
2 to 4									2		6						1		2	1	1	1	19	33
4 to 6									1	5	4	1		2		2	3		3	5		1	9	36
6 to 8							2			5	10	2	1	1				3	3	7		3	15	52
8 to 10									3	4	8		1		1		3	1	5	4		3	4	37
10 to 12		1				1			1	6	14	1		2			1	2	6	10		5		50
12 to 14	1		1						3	6	5						1	1	6	7		3		34
14 to 16	1					1	2		3	2	3		2	4				1	1					20
16 to 18	1						1		6		8		1	3						1	1			22
18 to 20							2		1		2			1	1			1	1	2				11
20 to 22	1						2		1	1	4			4										13
22 to 24	1						1				4							1	1					8
24 to 26																								1
Total	5	1	1	0	0	2	10	0	23	29	80	4	6	17	3	3	9	12	31	40	2	18	123	419

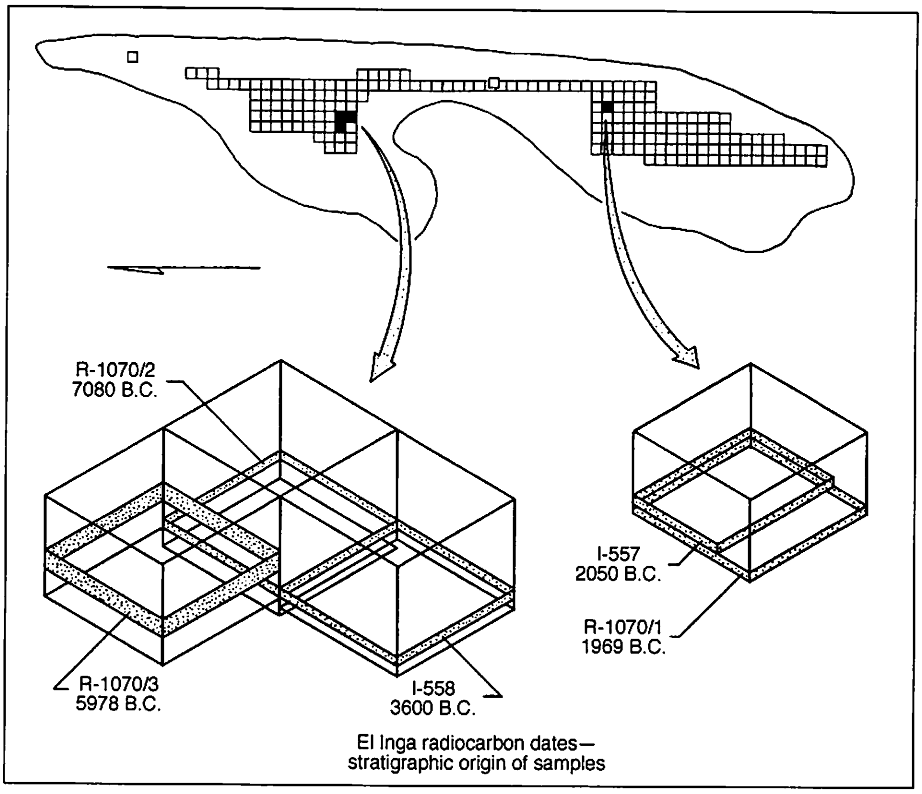


Figure 78. Provenience of radiocarbon dated soil humates at El Inga site.

ment of Scientific and Industrial Research Institute of Nuclear Sciences, Lower Hutt, New Zealand:

R-1070/1 3919 ± 121 / 1969 B.C.
El Inga Stratigraphic Block 1, square S37-L1, level 9, depth 16 to 18", collected by R. E. Bell on August 4, 1961.

R-1070/2 9030 ± 144 / 7080 B.C.
El Inga Stratigraphic Block 3, square S12-L2, level 11, depth 20 to 22", collected by R. E. Bell on August 19, 1961.

R-1070/3 7928 ± 132 / 5978 B.C.
El Inga square S12-L3, level 4, depth 12 to 16", collected by R. E. Bell on August 3, 1961.

The stratigraphic relationships of these dates is shown in Figure 78. Some observations with reference to these dates should be mentioned. Two specimens, R-1070/2 and I-558, are from the same levels in adjacent squares but vary considerably in their respective dates. Since specimen R-1070/3 is stratigraphically consistent with R-1070/2, it would appear that I-558 is in error.

The two specimens, I-557 and R-1070/1, from the southern section of the site are satisfactory dates for the stratigraphy in one square, but they are inconsistent with the dates from the northern section of the site. The acceptance of these two dates suggests that the southern section of the site dates some 4000 years later than the northern section, a distinction which is not strongly supported by distributional differences in artifacts. There are, however, some differences that have been noted earlier.

DISCUSSION AND CONCLUSIONS

The artifacts found at El Inga constitute an assemblage of materials that has not been reported elsewhere in either South America or North America. Some of the artifacts, such as the projectile points, occur elsewhere and serve as convenient cultural and chronological guides. Other artifacts, however, such as the striated scrapers, concave scraper burin cores, and burin spalls are presently unreported. The real significance of these items will emerge only after more work has been done, not only in Ecuador but in the rest of the New World.

The total El Inga assemblage has the flavor of an early lithic industry in which hunting served as the basic economy. The presence of fluted points, basal thinning, stem edge grinding, large plano-convex scrapers, bifacial knives, perforators, burins, and the absence of stone grinding, all suggest an antiquity comparable with the Paleo-Indian horizons of North America. The El Inga radiocarbon dates tend, in part, to support this view, although comparisons with other dated materials from South America suggest that the El Inga dates are too young. The time range of 5000 years that is further indicated by the available dates appears excessive although some time differences are suggested by the typology of the artifacts and their distributions within the site. It is deemed worthwhile to consider some of the individual artifacts with comparative materials from other sections of South America. For this purpose, the excellent survey of "Early Lithic Industries of Western South America" by Lanning and Hammel (1961) is essential.

The Fell's Cave Fish-tail projectile point is the most important type found at El Inga. It is represented by the greatest number of specimens and occurs by itself in the deepest parts of the site. These points are similar to those recovered by Junius Bird (Lanning and Hammel, 1961; Bird, 1938, 1946) in the deepest levels of Fell's Cave in Patagonia. At Fell's Cave the points are associated with extinct fauna, the horse and sloth, as well as some unidentified ground stone objects. There are two radiocarbon dates for the lower levels of Fell's Cave: W-915 at 8759 B.C. and C-485 at 6688 B.C. The two dates are contradictory, but Lanning and Hammel (1961:150) tend to discount the latter one. The older date of 8759 B.C. from Fell's Cave is considerably older than the oldest date of 7080 B.C. from El Inga. In view of other considerations, it would appear that one or possibly both dates are in error.

The Fell's Cave Fish-tail points found at El Inga are sometimes fluted while those found at Fell's Cave in Patagonia are not fluted. The presence of the fluting and its parallels with fluted points in North America suggest that the Ecuadorian specimens should predate the unfluted examples from the southern part of South America. Other discoveries of this type are very limited although Cruxent (1959, in Lanning and Hammel, 1961:151) report one specimen from Brazil. As to whether this Brazilian specimen is fluted or not, remains unsettled.

Looking northward, Sander (1959) reports two specimens of fluted stemmed points from surface collections at Madden Lake in Panama. Sander (1959:48) illustrates both specimens in figure 9a-b. Through the courtesy of Russel D. Mitchell of Balboa Heights, Canal Zone, plaster-of-paris copies of these two points were obtained for comparison with the El Inga specimens. Both specimens would fit into the El Inga Fishtail group although the smaller broken base is the more typical example. There are no dates available for these specimens from Panama, nor is it clear as to whether or not the stem edges have been ground.

More recently, Bullen and Plowden (1963) have reported the finding of fluted stemmed points resembling the Fell's Cave Fish-tail type in Honduras. Two specimens are illustrated in figure 2a (Bullen and Plowden, 1963:384). It is of interest to note that the Honduras locality has also produced tapering stemmed points, scrapers, prismatic knives, and utilized flakes of obsidian which also resemble artifacts from El Inga.

According to Bullen and Plowden (1963:385) fluted stemmed points are also known from Costa Rica. Earlier reports indicate the presence of fluted points in Costa Rica (Swauger and Mayer-Oakes, 1952), Guatemala (Coe, 1960) and Mexico (Aveleyra Arroyo de Anda, 1962).

Thus, it would appear that fluted points can be traced from the western plains of the United States southward through Mexico, Guatemala, Honduras, Costa Rica and Panama into South America where they first appear at El Inga. Examples should occur in Colombia, to the north of Ecuador, but conversations with Gerardo Reichel-Dolmatoff of Bogota, Colombia, indicate that specimens are currently unknown in that region.

Another characteristic projectile point from the El Inga complex is the broad-stemmed point of which Figure 27A and E would be good examples. This type is large in size, exhibits basal grinding, and may be merely a large variety of the Fell's Cave Fish-tail type. The lack of fluting and the generally larger size, however, may be significant. The specimens from El Inga do not extend to as great a depth as the smaller fish-tail forms although it is believed that the two types are closely related. This broad-stemmed type is apparently a specialization in Ecuador, and Carluci de Santiana (1963) has presented data concerning its known distribution.

There are five ovate or leaf-shaped projectile points from the excavations although no examples were found in the stratigraphic blocks. They appear later than the Fell's Cave Fish-tail type and at the same time as the broad-stemmed forms. Since ovate forms are widespread in South America, it is somewhat surprising that they are so poorly represented at El Inga. The El Inga specimens are quite unlike the El Jobo examples from Venezuela to the north (Cruxent and Rouse, 1958, 1959) and have a closer resemblance to the willow leaf Ayampitin types to the south (Lanning and Hammel, 1961). These are considered to be the hallmark of Lanning and Hammel's Period III which is believed to date between 6000 and 3000 B.C. The El Inga specimens, however, have considerable range in size, and the basal sections are commonly more triangular than rounded in outline.

Finally there are some contracting stemmed forms and barbed types represented at the site. These appear to be the latest types and follow the leaf shaped or ovate forms, which appears to be the case in other parts of South America. It is quite possible that, since their bases are broken, the three specimens, discussed under barbed points, actually belong with the stemmed types.

Thus, in so far as projectile points are concerned, the earliest type is the Fell's Cave Fish-tail which is in turn followed by the broad-stemmed points and the ovate forms; finally, the stemmed types appear. This seems to be the general chronological sequence in other parts of South America, and it is repeated throughout most chronologies in North America.

The knives found at El Inga are not very helpful in so far as chronology is concerned. The single hafted stemmed knife can be assigned along with the Fell's Cave Fish-tail projectile points on the basis of typology; the other bifacial knives and flake knives appear in all levels.

The scrapers, on the other hand, present certain differences in their distributions. The flake scrapers, blade-like scrapers and plano-convex scrapers occur in all levels. The concave scrapers and the striated scrapers occur only in the upper four levels. There is also the hint that the basalt plano-convex scrapers may be slightly later than those made of obsidian. An examination of the plano-convex scrapers, when arranged according to the various depths, suggests that the larger specimens are more common in the lower levels and that the scrapers become smaller through time.

The small perforators do not occur in the deepest parts of the site, and their greatest number appears in the upper levels.

The burins, concave scraper-burin cores, and burin spalls also differ somewhat in their distribution. The simple burin is represented in the deepest levels by a single example, but it is considerably more abundant in the later levels. The concave scraper-burin cores do not occur at depths over 16" but appear in quantity at level 4 along with numbers of burin spalls.

These chronological suggestions should be considered as tentative or as a working hypothesis. The cultural deposit at El Inga is not very thick, and the total numbers of specimens are quite small. A glance at the tables showing the distribution of artifacts from the stratigraphic blocks and the entire site will show weaknesses in the stratigraphic evidence. Nonetheless, the variety of projectile points, the variations in artifact distribution not only in depth but horizontally within the site, and the range in radiocarbon dates now available provide some evidence, admittedly weak, to propose three complexes for the site. These would include the following artifacts (significant items for each period are underlined):

El Inga I:
- <u>Fell's Cave Fish-tail points</u>
- Bifacial flaked knives
- Flake scrapers
- Blade-like scrapers
- <u>Large plano-convex obsidian scrapers</u>
- Simple angle burins

El Inga II:
- <u>Ovate or leaf shaped points</u>
- <u>Broad-stemmed points</u>
- Bifacial flaked knives
- Flake knives
- Flake scrapers
- Blade-like scrapers
- Obsidian plano-convex scrapers
- Basalt plano-convex scrapers
- Simple angle burins

El Inga III:
- <u>Contracting stemmed points</u>
- Bifacial flaked knives
- Flake knives
- Flake scrapers
- <u>Concave flake scrapers</u>
- Blade-like scrapers
- Obsidian plano-convex scrapers
- Basalt plano-convex scrapers
- <u>Striated scrapers</u>
- <u>Concave scraper-burin cores</u>
- Simple burins
- Burin spalls primary and secondary
- <u>Perforators</u>
- Basalt scrapers flake
- Striated stone
- Abraded flakes slot-cutters

This suggested sequence will provide a working hypothesis that can be tested by work at other sites in the immediate vicinity of El Inga. There are a number of other sites in this region, and surface collections already indicate differences in their context. The sites are characterized by a varied chipped stone assemblage and should be helpful in testing the above hypothesis or in providing additional information about the early cultures of highland Ecuador. This will require excavations of a similar nature to that done at El Inga in other sites which have been carefully selected to solve specific chronological problems.

One problem concerning El Inga which still remains unsettled rests in the fact that a number of artifacts which were collected from the surface did not appear in the excavations. For example, there are a number of crude basalt implements such as thick scrapers and scraper planes (pulping planes) from the surface, but none were found in the excavations. Consequently, the relationship of these items to the El Inga assemblage remains unknown at this time. Moreover, these items are abundant on certain other sites and must form an integral part of the archaeological complexes in the region.

The actual dates for the El Inga complex remain uncertain in spite of the available radiocarbon assays. The early date from Fell's Cave suggests that the El Inga dates should be earlier than 7080 B.C. in view of projectile point typology. Also, the youngest date of around 2000 B.C. appears too late in view of the simple chipped stone assemblage, the absence of ground stone implements, and the fact that, by this date, there were highly advanced cultures existing elsewhere in Ecuador (Estrada and Evans, 1963).

SUMMARY

The site of El Inga is located in the Andean highlands about 12 miles east of Quito, Ecuador. The discovery of fluted projectile points focused attention upon this site, and during the summer of 1961 a period of approximately two months was spent in excavations. These were concentrated within the largest remaining section of the site that had not been destroyed by erosion. A total of approximately 200 5' squares was excavated by arbitrary levels, each four inches in thickness. For more careful control, three stratigraphic blocks (each 10' square) were excavated by 2" levels.

The site is composed of an unstratified occupational soil mantle averaging between 16 and 18" in thickness and resting upon a sterile volcanic deposit known locally as cangahua. The top surface of the occupational deposit has been plowed throughout the years, and pottery sherds of modern as well as prehistoric manufacture appeared in this disturbed layer. The occupational debris appears concentrated within the lower section of the occupational mantle although artifacts are to be found throughout the entire deposit. Excavation revealed an absence of occupational floors or distinct surfaces, fireplaces or hearths, animal bones, or other occupational features other than chipped stone debris. The presence of numerous artifacts and abundant chipped stone debris such as chips and flakes of obsidian and basalt, however, indicate that the locality had been used as a habitation area for some period of time.

Artifacts recovered from the excavations include pottery sherds which are believed to be intrusive and a number of chipped stone items made chiefly from either obsidian or basalt. These artifacts include several varieties of projectile points including, the fluted Fell's Cave Fishtail type, a broad-stemmed form, a contracting stemmed form, an ovate or leaf shaped form, and some unique specimens. Knives are represented by a single stemmed specimen, bifacially chipped ovate forms, and simple flake. Scrapers are also abundant and are represented by several varieties: simple flake scrapers, concave or hollowed scrapers, blade-like scrapers, plano-convex scrapers, and a specialized type designated as the striated scraper. Burins are represented by simple angle burins, dihedral angle burins, and concave scraper-burin cores along with an abundance of burin spalls, both primary and secondary. Other objects include perforators, basalt flake scrapers, striated flakes, an object termed a "slot-cutter," small pieces of hematite, and a single striated or grooved stone.

Detailed studies of all materials from the excavations according to their distributions within the site and a comparison with other known assemblages in western South America are used to propose a sequence of occupations which are designated as El Inga I, II and III. This suggested sequence is based upon weak but suggestive evidence, and the characteristics of each period are listed for future verification or correction.

The available radiocarbon dates suggest an occupation ranging from roughly 7000 B.C. to 2000 B.C., a period of about 5000 years. In view of other considerations it is felt that these dates are too young and that a greater antiquity should be indicated.

The earliest materials (El Inga I) are believed to be related to the early Paleo-Indian horizons to the north in western North America and to represent an early movement of peoples utilizing a fluted point tradition into South America. The later materials (El Inga II and III) tend to show relationships toward the south, but the presence of certain distinctive artifacts (burin technology) and our ignorance of these items in South America make comparisons very speculative.

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The photographs and drawings, with the exception of those mentioned above, were made by the author. The illustrations were drawn actual size, and the scale is expressed in centimeters.

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