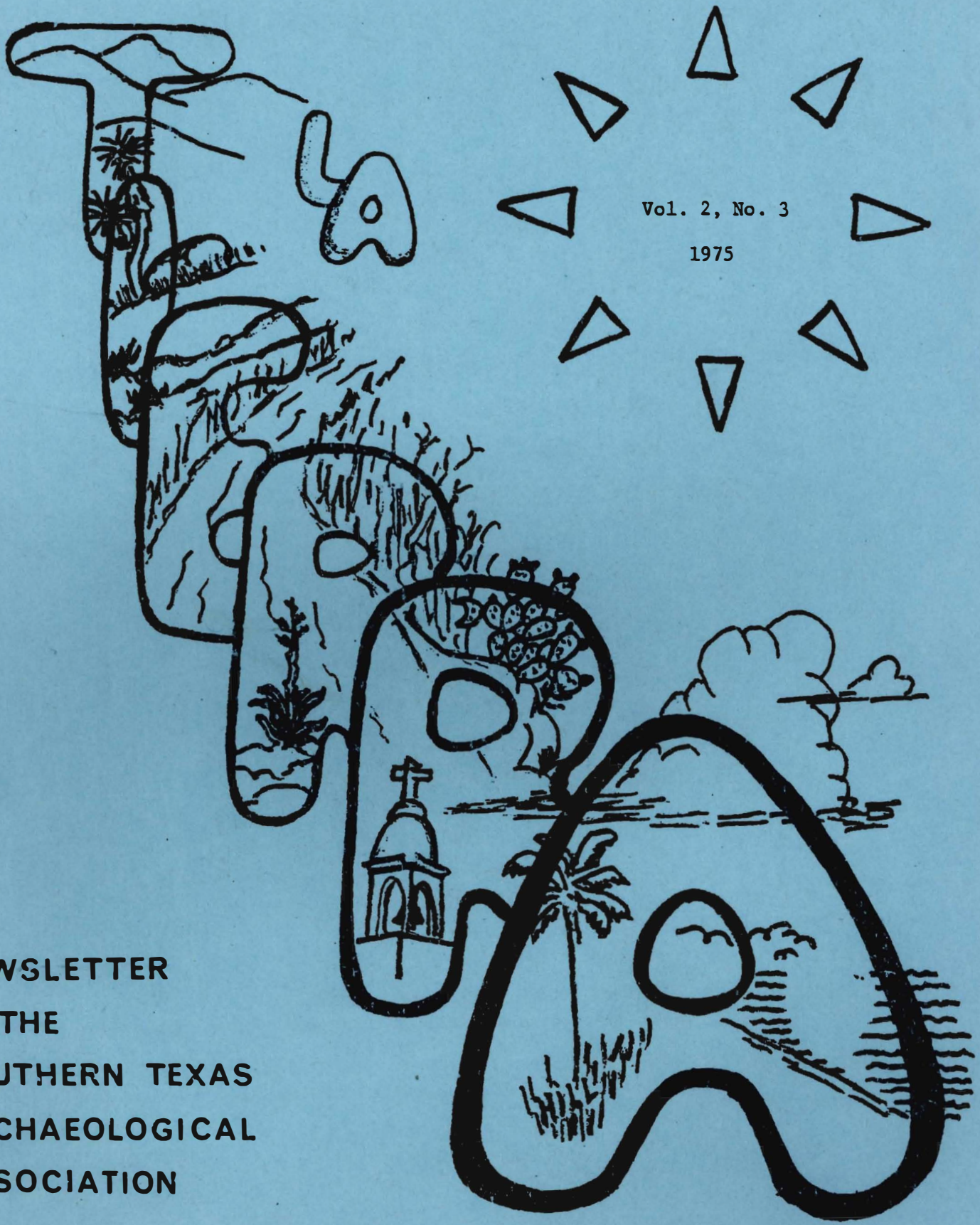
FILE



Vol. 2, No. 3

1975

NEWSLETTER OF THE SOUTHERN TEXAS ARCHAEOLOGICAL ASSOCIATION

LA TIERRA

Quarterly Newsletter of the Southern Texas Archaeological Association

Volume 2, Number 3
July, 1975

T. C. Hill, Jr.
Newsletter Editor

NEW MEMBERS (from April 1, 1975)

Bradfield, Mrs. Tom (Laura), Box 207, Comfort 78013
Chenault, Dr. & Mrs. C. Brandon, 110 Parklane Dr. 78212 (822-3267)
Damsgaard, Mary, Grinnell College, Grinnell, Iowa
Dymond, Jan, 1717 W. 35th, #204, Austin 78703 (512-454-5023)
Fawcett, Wm. B., Jr., 416 Dolorosa 78204 (492-1885)
Ford, Mr. & Mrs. Thomas (Sandy), 105 S. Weidner 78233 (653-4977)
Franklin, Mr. & Mrs. Claude, Jr., Box 147, Tilden 78072 (512-784-3241)
Hamilton, Mr. & Mrs. Ed (Elizabeth), 1002 Baylor, Austin 78703 (512-478-7594)
Harp, Mrs. Reed (Bebe), 362 Maplewood 78216 (828-7882)
Harrison, J. Lesley, 6119 Townwood 78238 (684-6737)
Henderson, Mr. & Mrs. J. A. (JoAnn), 310 Howerton 78223 (534-1770)
Newman, Noel D., 421 Maverick, #3 78212 (224-0532)
Olijar, Pamela M., 4411 Gardendale 78240 (696-5839)
Sandison, Stuart W., 610 W. Ave. B, Alpine 79830 (915-837-2714)
Vogler, J. N., 5 Anvil Court, Cherry Hill, N.J. 08003
Vogt, Mrs. Harvey C., Box 483, Boerne 78006
Yates, Mary S., 8702 Village Dr., #505 78217 (656-2686)

CHANGE OF ADDRESS

Ford, Mrs. Laura, 115 W. Edgewood Pl. 78209 (826-6487)
Medlin, Tom, 3807 Willowbrook, Austin 78722 (512-478-6302)

MORE ANTHROPOLOGISTS AND ARCHAEOLOGISTS IN SAN ANTONIO

The numbers of professional anthropologists working in the San Antonio area continue to grow. A new addition to the faculty of the Division of Social Sciences at UTSA is Dr. Joel Gunn, an archaeologist. Dr. Maria Luisa-Urdaneta, a cultural anthropologist, will also be on the Division staff this fall.

Jack D. Eaton, an archaeologist with extensive experience in the Yucatan, has joined the staff of the UTSA Center for Archaeological Research.

Dr. Anthony Coelho is now at the Southwest Foundation for Research and Education, serving as Primate Behaviorist. Susanna Katz will begin teaching anthropology and archaeology at Incarnate Word College this fall. Paul Katz will be working on his doctoral dissertation and participating in archaeological work in the area.

MORE SITE REPORTING IS NEEDED

STAA members are urged to continue the important work of site recording. Site survey forms are available from the STAA secretary, Jamis Townsend (address: 706 Nottingham 78209) or from the STAA field work directors. Copies of the forms should be filed with the STAA secretary, or may be sent either to the Texas Archeological Research Laboratory (Balcones Research Center, Rt. 4, Box 189, Austin, 78757), or to the UTSA Center for Archaeological Research (UTSA, San Antonio 78285).

Edward Mokry, Jr., of Corpus Christi, has recently documented several sites in Nueces and Webb Counties.

VAL VERDE COUNTY EXCAVATIONS

Drs. Harry J. Shafer and V.M. Bryant, Jr. (Texas A&M University) are conducting excavations this summer at Hind's Cave in Val Verde County. Their work is supported in part by a grant from the National Geographic Society.

REMARKS FROM THE EDITOR

May 17-18 dated another bonus quarterly meeting for the STAA, with the sights set on Texas' Paleo-Indian puzzle and the mood of the gathering one of sheer fun. Again, the Division of Social Sciences at UT-San Antonio provided us with ample quarters, and again we're appreciative.

We learned at the business meeting that our membership has risen to about the peak numbers of 1974, but that we need a good publicity person to get The Word spread among the various news media of Southern Texas, to boast our organization and its aims. This post needs filling, it is critical to the health of our outfit, and with the entire Texas Archeological Society coming to meet with us in November...well, we need a HERO! Shirley Van der Veer, our Membership Chairman, has been doing double-duty with the publicity post. But, the chore of keeping up with our membership is job enough.

Excellent speakers entertained us at this meeting, the first being Smitty Schmiedlin of Victoria, who laid out his five fascinating Paleo-Indian sites with expertise. He and Bill Birmingham have been tending these sites for several years, watching them crumble and collapse as the deeply cut, often-flooding creeks which first exposed them continue to nibble away at the ancient camps.

Col. Thomas Kelly discussed his most recent interest, which has to do with a careful study of regional Paleo-Indian dart points, attempting to furnish us with better descriptions and conclusions toward recognizing these rather rare treasures of a long-gone lifeway. Most exciting, probably, is his dwelling upon the Plainview style and the Plainview golondrina, heretofore classed in a sort of first-cousin category. He pointed out distinct differences which might now justify calling the latter Golondrina and giving it its natural niche in the Texas scheme.

Our delightful top drawing card, State Archeologist Curtis Tunnell, completed the afternoon session with a talk and slide show of his big Steadman site up along the Clear Fork of the Brazos, in the Abilene vicinity. This tremendous Folsom emcampment, if I understood him correctly, covers an area of several hundred yards along the sides and perhaps 300-500 years in time.

The recovered debris from the site will eventually be measured in tons, nearly, and he'll someday be able to lay out the most complete description of the Folsom people yet available.

The Saturday night round-table session dealt with the "South Texas Paleo-Indian", and proved, if nothing more, that folks no longer believe everything they read...there's got to be an improvement in that. Seems we'll just have to start all over again and rewrite the story, as we gradually work it out of the ground.

* * * * * * * * * * * *

I got up to the UTSA second annual Field School at the Chaparossa Ranch, at its mid-point during the third weekend. A sprightly crew of 12 students and their leader, Dr. T.R. Hester, entertained me royally, and I came home more thoroughly exhausted than after last year's visit. This bunch was youth-oriented, did not have the killing 110° temperatures that occurred in 1974, and was going all-out. A little thing like a midnight monsoon, with all the tents blown away, did not make a dent in their enthusiasm, and they continued to punch highly productive holes in the ground and found remarkable treasures. The students were: Tom Kelly, E.S. Harris, Joe and Wanda Kaufman, Leo Fletcher and Irma Richie (all from UTSA), Barbara Wolf (Austin), Joan Melasky (San Antonio), Stuart Sandison (Sul Ross; Alpine), John Montgomery (Texas Tech; Lubbock, Mary Damsgaard (Grinnell, Iowa), and Charles Moffatt (University of Pennsylvania; Philadelphia).

T. C. Hill, Jr.

REMINDER OF TAS MEETING IN SAN ANTONIO

Please reserve, on your calendar, the dates of Oct. 31, Nov. 1, and Nov. 2, for the annual meeting of the Texas Archeological Society, to be held in San Antonio. The meeting will be at the Sheraton Motor Inn, 1400 Austin Highway. Registration will begin on Friday, Oct. 31, and the annual business meeting will be held that night. Saturday will be devoted to presentations of papers by Society members. There will be artifact displays and various archaeological publications from around the state will be on sale. Saturday night will feature the TAS banquet, and the guest speaker will be Dr. Robert F. Heizer, Professor of Anthropology at the University of California at Berkeley. Prof. Heizer is one of the best known archaeologists in North America, and has published hundreds of articles and books on his research in California, the Great Basin, Mexico, and Egypt. His talk at Saturday night's banquet will deal with the Olmec culture of the Mexican Gulf Coast. He will examine some of the early work at sites like La Venta (in which he participated in 1955 and 1967), and will summarize the present knowledge of the New World's oldest known civilization. This lecture will be illustrated with slides.

On Sunday morning, a special symposium is being planned, focussing on "The Archaic in Texas". Amateur and professional archaeologists from around the state will provide summaries of what is presently known about the Archaic in various regions.

This TAS meeting promises to be an exciting one. The STAA is the host organization, and there is a lot of work to be done. If you would like to help, please contact Anne Fox, STAA president, or Dr. Thomas Hester, program chairman, for the meeting.

PROJECT GATEWAY

The University of Texas at San Antonio has recently been awarded a grant of over $69,000 from the National Endowment for the Humanties for a two-year project involving the Spanish Colonial missions at Guerrero on the Rio Grande, just south of Peidras Negras, Coahuila. Archaeological and ethnohistorical research will be conducted, and will hopefully shed new light on the mission Indian populations gathered into these missions beginning in 1699. The Guerrero missions (San Juan Bautista, San Bernardo, San Francisco de Solano) are the forerunners of the later establishments at San Antonio.

Dr. R.E.W. Adams is project director. Dr. T. R. Hester will supervise the archaeological research and Dr. T. C. Greaves, the research in ethnohistory. Other personnel involved in the project include Dr. Parker Nunley (survey archaeologist), Jack D. Eaton (deputy field director), Stephen Vollmer (assistant archaeologist), and Anne A. Fox (consultant in historic archaeology).

THE NEXT ISSUES OF LA TIERRA

The Editor now has a respectable backlog of manuscripts for forthcoming issues, but readers are still urged to contribute short papers and other items of interest. Included among future papers to be published in La Tierra are a brief note on south Texas chronology by J. L. Mitchell, some observations on the work at Timmeron Rockshelter authored by Harvey P. Smith, Jr., a description of a site in Kinney County by Lee Patterson, and a note by Jim Warren on a sandstone artifact from Live Oak County.

EXPERIMENTS IN POTTERY-MAKING

T. C. Hill, Jr.

Preface

Experiments in archaeology have a long history, going back at least to the middle of the 19th century. There has been a tremendous resurgence of interest in experimental archaeology in the past decade, and a vast literature now exists (see T.R. Hester and R.F. Heizer "Bibliography of Archaeology I: Experiments, Lithic Technology, and Petrography", Addison-Wesley Module in Anthropology 29, 1973; see also Chapter 11 in Hester, T., R. Heizer, J. Graham, Field Methods in Archaeology, Mayfield Publishing Co., 1975).

The results of a wide range of experiments have been published by both professional and amateur archaeologists. There have been experiments in flint-knapping, pottery-making, drilling in stone, metallurgy, wood-working, tree-felling with stone axes, replication of cave paintings, and so forth. To be sure, these experiments have varied widely in their sophistication, but the vast majority have contributed to our knowledge of how prehistoric artifacts were made and used, the behavioral implications of artifact manufacture, and other technological activities of primitive peoples.

The following paper by T.C. Hill, Jr., of Crystal City, Texas, provides the reader with much more than the highly technical prose with which the professional usually reports the results of archaeological experiments. It is written in the readable, often flamboyant, Hill style to which readers of La Tierra have already become accustomed. As Hill relates, he became interested in pottery-making as a result of his research into the late prehistoric ceramic tradition in southern Texas. Originally, his sole intent was to replicate the bone-tempered ware found in this region. But those of us who know T.C. have long since learned that he never does anything "simply" or half-way, whether it is site survey or singing Mexican corridos in a field school camp. Thus, with typical Hill fervor, he became totally involved in the world of primitive pottery-making. I believe that his paper contains a wide variety of data, derived from his experiments and observations, that will be useful in the continuing studies of late prehistoric lifeway in southern Texas.

Thomas R. Hester
University of Texas at San Antonio

* * * * * * * * * * * *

INTRODUCTION

For several years the author had probed into a number of late prehistoric pottery-bearing sites located alongside certain waterways in Dimmit and Zavala counties. The lucrative returns, he finally noticed, were almost uniform in that no single sherd appeared much "better" or much "inferior" than the "average"; in other words, there seemed to be no "learning stage" of Leon Plain manufacture here in the western brush country.

Curiosity regarding the above phenomena, plus the scarcity and high cost of gasoline, plus a kid in college, all combined to provoke the author to test the old adage, "poverty breeds ingenuity", and he determined to attempt to experimentally reproduce Leon Plain pottery. This experiment, he reasoned, was calculated to consume a year's time and should be a cheap substitute for field work, and might just provide some worthwhile insights to serious students of primitive pottery.

His education in the technical nature of the undertaking was absolutely zero, and he had not even the faintest notion of how to begin. He attempted to consult the few local "modern" ceramacists, but their idea of ideal production was the use of prepared, mixed commercial clays which might be wheel-turned into articles of nearly production-line perfection, to later be fired in an enclosed baptismal atmosphere of absolutely even heat to nearly the exact recommended degree of temperature. They had never experienced the shattering finality of the "open-fire" explosion. He found these folks to be kindly and frowningly attentive, but their usual advice was, "Go buy a good book" as they wandered off to explore the hors d'oeuvre layout and to no doubt seek more stimulating conversation. Now, two years later, the gulf between the local expert potters and the primitive has widened even more. There is growing respect on both sides, but coherent conversation still is not possible.

But help soon showed up from an unusual direction. A final desperate journey back to the 300 year-old "Holdsworth Island" pottery site (41ZV14) on Tortugas Creek, in search of some form of meditative inspiration, produced something close to a miracle. This was, of course, Little Flower, the figmentive fourteen year-old ghost descended from the Island's many-thousands of "Coahuiltecan" ancestors. She claimed to know pottery and volunteered "for as long as it takes...after all, somebody has to do it".

She proved a delightful, silent companion, never opening her mouth except for that one time at a certain STAA quarterly meeting. Now she says she's due back right away at the Happy Hunting Grounds, and we either publish or forget it. Besides, she's afraid we are beginning to consider ourselves slightly sophisticated at our work, and that was not in the contract.

CLAYS

We begin in July of 1973 by going directly to 41DM70, the big site in northern Dimmit County where several thousand sherds have been found, and gather a hundred or so pounds of the fine sticky mud which outcrops at the foot of the campsite. This yellowish-gray material is loaded with tiny gravels and some sand, and although we don't know "clay" from a sack of cornmeal, we cannot forget slogging through this particular area after rains and frowing six inches taller as it sticks to our boots. We roll it into little balls, mash it, string it out into thin ropes, and notice how it feels "cheesy" and gummy, and also find that it tends to cling to itself with little cracking. We nod to ourselves, grin, and gather a hundred pounds or so of it.

Five hours later, after playing with the wet substance, we find we've managed to pinch out one pathetic little "ash tray" which later fires to something resembling solid rock, an achievement which seems marvelous at the time, and still does.

Several days later we've managed to manufacture several other objects of questionable character. One is a flat, thin oval disc into which is pressed a full handprint, a la the Pecos Caves rock art; others are a pair of long, narrow, flat-bottomed "window planters" (one bone-tempered, one...of all things...salt-tempered), and a small bowl to which salt is also added. These things are later fired-out as well as can be expected, and are still revered artifacts from the very beginning of the project.

We have been pinching little gravels out of our mud, and find this to be a slow agonizing process, so we attempt to more rapidly remove this material by dumping it into a washtub, covering it with water and melting it, to see if the heavier stuff will settle to the bottom. It is so sticky that it takes much mashing and stirring with a garden rake to fragment it, but the heavier gravels and sand grains do indeed settle out, and we're extremely surprised to find that the fine "clay" has "suspended" in the water. We syphon off water for several days, our still-suspended clay thickens,

and we are able to scoop it out into pie pans to store for later use. (Later, we found that this soupy clay can be shoveled over an old blanket to more quickly firm-up and be ready for immediate use, but serious marital misunderstandings often result from the mis-use of the family heirlooms and we learned to be furtive with the ancient blankets and kitchen stove ovens, etc., in future experiments.)

As it turned out, this highly refined 41DM70 clay can never be fired successfully, and we believe it to have been too "hot" for the fierce fires of that era. However, mixed with other slightly sandy pastes and in more moderate fires, we produce very spectacular results with it. We look forward to another go at it, to produce perhaps wonderfully firm pots with careful mixing and tempering.

About this time we are going to other areas where we remember walking about on sticky muds, after rains, to gather more varieties of "clays". We use these by simply adding water and squeezing out the lumpy objects, and find that some are very usable while some are absolutely worthless. For example, rotten, deteriorated white limestone powder forms pretty dry pots but cannot be fired.

The pits of new, deep stock tanks are explored, and thin layers of brightly colored clays are always found, collected and given a 2-3 week run. These exotic deep clays are mostly very nice to use, fire-out to amazingly beautiful hues, and need only more testing to be worked with confidence. However, they always contain enclosed layers of crystals which when squeezed from the wet mass provide no difficulty at first, but which are pure trouble if ground up along with the dried clay. This is gypsum, we're told, and when powdered and fired it turns to plaster of paris. Imagine a dozen pretty, perfect little pots made of a crushed clay-gypsum mixture...for 12 hours or so they're perfect, then a couple of cracks appear as the ordinary high local humidity penetrates the fired pots, and in just about no time the pots are a pile of lumpy powder. A revolting development!

Equally as revolting is the wonderful yellow clay from our "Elephant I" site (41ZV7) on Tortugas Creek. Five mammoth teeth lie embedded upon its deep surface, exposed in the bank-profile by swirling floodwaters...a number of Golondrina points have been collected from its eroded surface, 25-30 yards to the east. It is slightly sandy and shows a few tiny white caliche nodes, but works nicely and fires to a soft medium brown, and actually produces the prettiest pots we've made and fired up to this time. But again, with a week of humidity, our pots commence to deteriorate. The little caliche nodes swell and very gently force little circular spalls from the pots' surfaces. This destruction continues to the present day and will no doubt do so forever. A round of birdshot at 15 yards will produce the same result, and likely be more merciful.

We continue to gather new "clays" at every opportunity, from widely scattered areas, and when they are not usable as pot material, we thin them to a "slip" of creamy smoothness, paint them upon the surfaces of dried pots whose original material fires-out rather drably, and sometimes discover really remarkable hues of pink, flesh, orange, red, maroon, brown, or magenta.

But all this time, messing around with exotics and strangers and useless failures, we notice that we are not getting anywhere near the classic requirements of bone-tempered Leon Plain pottery. If we produce the surface, thin-wall hues of reddish to brownish colors, the cores between the walls are also of homogenously similar tints, and everybody knows that Leon Plain exhibits a core of dark gray to pure black, except right at the rims or sometimes in the handles. We are somehow missing the boat, but cannot fathom our failing.

And all this time, we've been tramping around all over the answer to the problem. In the back yard, along the creek banks, lots of places...it is simply the recently

deposited silty, slick black (when wet) mud of only a few thousand years of age which forms much of the surface here. We call this nasty, root-filled, snail shell and burnt rock and flint flake-impregnated goop "Black Gumbo", which may not perfectly describe it but which is fairly accurate. When we begin to use this easily available and widespread material, we begin to produce "real" Leon Plain, and with a vengeance.

It contains the debris of what must be a long series of Archaic campouts, is very repulsive to work in that it sticks to hands, clothes, tools, everything, but we have never been able to burn away the black cores it produces with our moderate heats, even after a second or third refiring! (We've learned, since "discovering" this wretched mud, that it has been used, in this area, as recently as 35-40 years ago to produce bowls, etc., for actual home use. Maria Castillo of Crystal City has related how her mother gathered it from the banks of the Nueces River and manufactured household utensils: "We were very poor". Some form of waterproofing or glazing was practiced, but she's forgotten the method. Al Cantu, who owns and operates "Tonicraft Ceramics" on Mission Road in San Antonio, says his mother collected it from the Nueces near Cotulla to make a skillet for refrying frijoles. ("Everybody knows the home-made skillet fries the best beans!") She achieved a pretty good waterproofing by coating her vessels with a mixture of hog fat and the sticky liquid drawn from the "corn bucket" (the lye-water used to soften the kernels), setting the skillets on the stove and gently heating them after a couple of applications of this "sealer".

*Afterthoughts: We deliberately avoided "buying a good book" for a year or so, forcing ourselves to work entirely from trial and error and "feel", forcing ourselves to "reason" as best we were able. We kept copious notes of our many failures and our few successes, but quickly mailed them away to interested colleagues... Drs. T.R. Hester of UTSA and Harry J. Shafer of Texas A&M...so that we'd have nothing but "memory" to work from. These notes will no doubt reveal many bad decisions, journeys down into dead-end streets which seemed entirely plausible at the time, and perhaps a few simple "truths".

When we did begin to buy good books, to borrow them, to study them, we found that they spoke of mostly highly technical chemical, physical and geological ideas, which at first confused us and left us as wretchedly ignorant as we had been at the start. These books reveal findings of a very recent nature, gleaned and refined from the many generations of ceramic trials-and-errors which are global in depth. But eventually we determined that these facts are of the utmost necessity to both the mass-producers of fine chinas as well as to the dedicated studio potter and the manager of a brick factory. So we began to understand that we had, in our hands, many of the explanations to our occasional "successes".

For example, we found that "clays" are the infintesimally powdered results of the degeneration of mostly volcanic rocks, the most ideal of which is a white "kaolinite" with a composition of alumina and silica, the particles of which are "fish-scale" in microscopic shape, so fine as to make Johnson's Baby Powder feel like grit. Clays occur sometimes at the sites of their formations, but are more often scattered by weathering and mixed with numerous impurities which lower their peak firing melting-point, increase their drying and firing shrinkages, and darken their colors. The latter clays include the so-called "fireclays", "stoneware" and "red" and "ball-clays" and on and on, all of which melt at different known temperatures, all of which may be mixed with each other and iwth koalinite, to produce predictable results which are absolutely necessary to an operation dealing in commercial products such as bricks, tiles, earthenwares, stonewares, chinas, porcelains, etc.

Clays are rendered "plastic" by the addition of water which allows the scale-like particles to slide over one another, meanwhile still attracted to one another and held in place, when not disturbed, by electrical cohesion. A "clay" which may be worthless when used alone can most often be improved by the addition of other materials, such as other clays, ground-up additives, etc., but this improvement can only be tested by much practice. Since Little Flower and I cannot produce the heats with our simple open fires necessary to "melt" our local muds, we do not give a passing thought to that phase, but we have often found much improvement from variously tempering and mixing our assorted collections to achieve better "standing strength" and drying and firing dependability.

TEMPERING CLAYS

Since classic Leon Plain pottery is always tempered with crushed, powdered bone, we naturally begin our research by locating deer, cow and horse long bones and crushing them, raw, as best we are able. This is truly an onerous task, and has to be classified as "woman's work", although we notice that Little Flower never once offers to help. The idea is to smash the bones to splinters, scattering them all over the place to be later recovered and smashed again. When reduced to this state, we choose a nice limestone mano and proceed to grind the splinters against the concrete floor into as fine a dust as possible.

We find that by mixing this dusty-to-granular result with our probably too-wet, too-sticky clays, we have performed a sort of slight miracle in that the muds become more sturdy and manageable (less "goopy") and so we proceed to form vessels. The results are cometimes good, sometimes bad, but we learn we've found a reason for adding a "temper". However, our colleagues Drs. Hester and Shafer announce that our few successfully fired objects appear to lack something, and they think that perhaps if we burn our bones ahead of pulverizing, we may come up with something closer to "real". So we try this "burning". The bones become ridiculously easy to reduce to a powder, serve the same "firming" purpose when added to the sticky mud pastes, and fire-out to the same white granular appearance as do the raw bones. The burned bones, as well as burned mussel shells and other hard organic-mineral objects, held their shapes well during the charring, cracking a bit perhaps, but generally turning red hot and riding out the ordeal mostly in one piece.

So our chore is eased by burning our bones, and no real difference is noted in the finished product. But, at the time, we are still not reproducing the desired black cores between the colored walls, and we are becoming desperate, believing we shall never be able to discover this particular secret.

One night the "true answer" is discovered! St. Louis is whipping the Cowboys on T.V. and me and Little Flower are sitting there desolately knife-scraping the edge of a good Leon Plain sherd (from 41DM70). And a nice pile of dark "core-dust" from the sherd-scraping accumulates in our hand. We naturally take a sniff of it, and then an excited taste! Burned, rancid, stale grease, no mistaking it! We abandoned the hopeless ballgame, rushed to the garage to find 3-4 pieces of dry clay, dip them partly into a bowl of salad oil, place them upon a propped-up rack in the electric cook-stove oven as near the broiler coil as possible, and turn on the switch. Thirty minutes later we remove baked wads of hard red clay which bread, with difficulty, to expose reddish cores (where the grease has not penetrated) and beautiful black cores where it has!

This leads to several excited weeks of fooling around with greases. We go back to raw bones, but this time to fresh bones from pork and ham shoulder roasts, mashing and mixing the gristly mass with all the exotic clays of the period, getting results which run from widely-spotted black to spectacular even-black in fired cores. We try

salad-oil, we beg deer-tallow from neighborhood hunters, we even buy beef suet at the store! Chicken fat, hog lard, everything...we try it all, and we consistently get dark cores. Thirty-weight Texaco motor oil, poured over little pre-fired vessels and induced to burn again...anything, everything! We fill bowls with salad oil, set them in flaming mesquite coals and watch them begin to boil, to soon fill the air with little blue sparks, and then to ignite with a pretty blue flame and burn out. We store oils in once-fired pots for days, greasy stews, etc., and we thickly smear some pots with various melted oils...upon refiring, black cores. (Once we fried an egg in a mess of boiling salad oil, recovered and salted and peppered the football-shaped edible, devoured it and declared it to be delicious. This, in a bowl originally fired in cow chips. People asked, "Wasn't it nasty?" Not noticeably.)

But soon we come up with the "black gumbo" clay, and our fantastic grease-discovery is shot to smithereens. But, you know, we still ponder that Monday night when we first sniffed the rancid powder. Something lingers...grease storage, stews eaten from the little aboriginal bowls, to later be refired as a "cleaning" method?

*Afterthoughts: Many agents were tried as additive, "tempering" elements; salt (briefly, but satisfactorily until an "overdose" showed its spotty moisture-collecting action, which was actually predictable), crushed shell (mussel and marine), grog (mashed potsherds), crushed quartz, sand, just plain old dry dirt, crushed mammoth tooth, and once a mess of ground pecan shells. At the same time, test bowls with no added tempering were made side-by-side with the tempered vessels, and no real firing difference was ever realized. Perhaps some bowls dried more reliably than others, but the non-tempered wares never seemed to suffer from more cracking, precentage-wise, than did their tempered-companions.

*Crushed, burned bone never did seem to produce the miracle of "a drastic, magic chemical reaction between the calcium and the clay to produce the fine, thin, crisp Leon Plain sherds" that me and Little Flower had heard rumors of. We simply added "tempers" to strengthen our pastes, to reduce the extremely sticky effect of many of them, and could find no great difference between bone and other additives.

*The "good books" allow that tempers are presently added to "open up" extremely thick, fine clays, to allow more even drying with sometimes less shrinkage, and to give greater strength to very large objects during construction, allowing them to support their own weight more easily. If Little Flower and her predesessors ever once thought of any of the modern reasons for "tempering", it would surprise us!

*To absolutely crush the magic calcium-bone theory, we mailed several sacks of sherds about the country to various ceramic experts, and a sample was sent to Shell Oil Co. for study under their electron microscope. The report from Shell was: "We can find absolutely no good reason for tempering pots with crushed bone that might be in the slightest bit preferable to other ordinarily used agents", unquote, or something to that effect. No magic, no chemical miracle, nothing that a handful of shredded tree-bark or crushed limestone or mashed-up seeds might not accomplish as well.

*But, reading the "good books", we are informed that calcium, although blessed with a fairly high melting point, reacts with ceramic materials to form substances with a considerably lower melting peak. It gives hardness and durability, and is responsible for the great strength of bone china which is a far cry, we know, above our earthenware vessels.

MAKING POTS

After collecting our clays and adding probably too much water (very easily accomplished) and the various tempers above described, there remains only the chore of thoroughly mixing these ingredients, kneading and beating, and stirring them together as thoroughly as possible. Although we do not realize, at the start, that it is of the utmost importance to thoroughly pack the paste, tighten it up, compact it, squeeze out the air bubbles and reduce the moisture content to a "workable" smooth cheesy mass, we catch on before very long.

Our worktable, at first, is an old cable spool covered with a thick plastic sheet. Boy, does that clay ever stick to the plastic! Later we cover our table with thick smooth canvas-drill-like cloth, and things pick up immediately. Then we learn that a slightly grainy, nearly smooth sheet of mahogany plywood furnishes a wonderful working surface, particularly for rolling out long rope-like coils, and we continue to alternate between the cloth-cover and the plywood plank to this day.

At the beginning, we mix up and stir a new paste for a while, then we immediately make something from it. As often as not, bowls will barely begin to dry before a few rim-cracks appear, and we soon learn to store our muds in airtight containers for several days, where they seem to settle down, congeal, and become more dependable. (We recently ran a brief test along this line. A bowl was made of a brand new batch of bone-tempered gumbo, a second at paste-age of 48 hours, another at 5 days and one after a week of "aging". The results were predictable, with the first cracking while drying, the second not as badly, and from there on they dried well.)

To build pots, we need tools, and we accumulate probably 30 objects over the two years, most of which should be thrown away and forgotten. A rapid pot-maker loses much time by searching through a pile of junk for just the right tool, and we find that a nicely shaped wooden spoon, the long plastic handle of a rubber kitchen spatula, and a light thin tube like an old ballpoint pen body (for smoothing rims) and a knife for cutting edges and rims are likely to serve just about any requirement. For water, we cut out the side of a gallon plastic milk jug, leaving the handle on for ease of cleaning and refilling.

To begin, we tear off a chunk of clay, massage it and beat it on the workbench, meanwhile gazing off shrewdly into the distance as we visualize our masterpiece...and a small round-bottom bowl shall be the first objective.

Rolling the chunk of mud into a ball, we insert our thumbs into it and pinch and mash it, turning it in our hands and shaping it into a little bowl. Nothing to it! We make it even thinner. But, where did that crack come from? Wet our hands, fasten the crack back together; oops, another one! Fasten it back, set the little bowl down, study it a minute, realize that it does not look much like we had planned. (It is lumpy, one side bulges and the other doesn't. Now, it sags and collapses!)

So we wad it up and try again, until eventually we produce a silly, lopsided little vessel and we're about half-way proud of ourselves. We learn to shape things with agonizing slowness, but are soon piecing together slab-sided, box-like objects, "dinner plate" shapes, little bowls and a variety of other things, many of which later dry into piles of fragmented sherds, at worst, but sometimes into cracked but still tediously whole units at best.

We learn very early the futility of devising slab shapes, and discover at the same time the value of rounded, well-engineered forms which are better able to withstand the pressures of the future drying and firing phases. We learn that walls of uniform

thickness are most desirable, and eventually that thinner walls (if carefully nursed through the drying stage) are much more dependable in the fire.

In other words, we are beginning to have to think, for a change, and our game of "primitive pottery" takes on all the aspects of a well-planned contest of chess. And the more we learn, the infinitely more we are required to ponder our moves, to imagine ahead of time what possible effects these will have upon future reactions.

We soon begin to roll out "coils" of clay, to wind them one above the other and to fasten them together by pinching them around and around with fingers and/or tools. Probably our first vision is a "Mexican bean pot" shape, an olla with rounded bottom, recurved wall profiles and, no doubt, with handles.

Our vase-like, coiled shape attained, we take up a tool shaped somewhat like the broad, curving thin edge of a large mussel shell, place one supporting hand against the outside surface of the "vase" and begin to smooth away the inner coil-bulges and pinch marks. We proceed rather well, turning the little olla and working away. Of course, this tends to thin the wall of our vessel, and we soon turn our attention to the outer surface to repeat the "smoothing". Now, the outer wall is another problem... we have no tool (or anvil) to fit the inner curve to absorb the pressure of the outer smoothing tool; our hands are just not built right. (The truth is, we still haven't solved this problem; our little coiled vessels are still neater on the inside than the outside, but we're working on it.)

So our outer-surface smoothing turns into an up-and-down process, as opposed to the easier circular, horizontal inner smoothing. And sometimes the result is an atrocity. No longer humming a tune (sweating a bit, actually) we work away, waiting fairly impatiently for our pretty "olla" shape to emerge. The more we "smooth", the thinner the walls become and the thing simply spreads out wider and wider, to resemble the oddest widely-flaring bowl you have ever seen! It will not climb vertically, no matter how we manipulate it, but just becomes more broad!

In desperation we take up a wet knife and cut 3 pie-shaped slices from about the rim, down into the body, to then gather up the remaining loose rim ends and bend them back up and in, fastening their edges together and re-shaping the thing to actually achieve our "bean pot" shape. For several weeks, this is the method of olla manufacture: "Just like the Indians did it".

At about this time we learn that we must devise a method for making a great number of exactly similar pots to more accurately test our clays, tempers, dryings, fires, etc. This is impossible by the methods we are presently using, and so the idea of "molding" occurs to us.

We locate a somewhat cone-shaped bottle, press clay about the bottom and outer surface of it (realizing that it has to slip off, eventually), thin and smooth it and cut a neat rim just below the bottle's shoulder. Inspecting the product, we are horrified to find it has cracked into exactly 48 pieces, each firmly glued to the slick, polished surface of the bottle. And just that quickly we learn the futility of molding wet clay to glass, plastic, metal, etc., and also become familiar with the phenomenon of "shrinkage". We now become leery of molding [redacted] pot over the outer surface of [redacted] object, and it takes over a year to get over it. Recently we have formed several bowls and vases over the outer surfaces of various non-sticky things, with very nice results.

So we turn to "molding on the inside" and learn to line plastic cereal bowls with plyofilm, later with ordinary cloth, then later with old tee-shirt material which stretches nicely and produces less folding "wrinkle-marks" near the outer rims. Now we are able to mass produce our required similar objects, little four-inch

diameter bowls of absolute hemispherical shape, perfect for strength in drying and firing. We learn to produce very even wall thicknesses, and find that our wet tool and/or hand-smoothed, firmly-pressed inner surfaces finish out extremely well, requiring us to learn to fine-finish the outer surfaces (after removal from molds) to improve the overall appearance of the little test-pots.

We find that the bowls shrink away from their molds rather rapidly, with low humidity, and that they become fairly firm, yet semi-pliable, so that we can handle them with care and smooth the rims and outer surfaces with ease. We also learn that roughly-handled bowls will sometimes result in rim or body cracks, often practically invisible until after firing.

Measuring shrinkages, we determine that our local clays regularly dwindle by 8-10% from the brand new to apparently bone-dry stages, and after tediously nursing possibly 60-70 little "test bowls" to fired completion and mailing them to our interested colleagues for inspection, we begin to turn our attention toward more complicated and "prettier" shapes. We join a pair of little test bowls together at the rims, producing a hollow oval, and learn to cut a hole in one side for attaching a tube, to produce a "vase". We study photos of flaring-rim bowls, wonder how on earth they are accomplished, then soon learn to wet-tool-manipulate the original little hole upward and outward to produce the miniature small-mouthed, recurved beauties of the Southwestern Indians. We find that there are many new problems resulting from these more complicated forms. Thicker bottoms are called for, in the "upper" bowl of the hollow ball, to furnish strength to support the vase neck, to prevent the cracking, "shaggy" unraveling when little rims are drawn upward and outward, to generally offset the rough handling which the soaking-wet clay must suffer from manipulations of this sort. Also, the "seams" where the two formed bowls are joined become a source of trouble, and we are hard-pressed to devise a fool-proof "joint-process" which will regularly survive. There is also this problem with neck-joints, with handles, etc.

Speaking of handles, we nearly lose our sanity fooling with them! One pair snaps away during firing, another pair cracks off after cooling, while yet another tears off hunks of the very pot-wall! Oh, we know, everybody makes them and there is nothing to it, etc., but we are not everyday-successful at it, by any means. And we become very uneasy when an admiring friend picks up and dangles a new pot about the room by one finger in a handle, desperately praying that the thing can just outlast this one final abuse, vowing to retire it to a high shelf, out of reach, in the future.

A game of chess? Definitely...but soon we begin thinking about very large similar vessels, and find that the problems are similar but strangely compounded, although the bigger things are probably more easily constructed, less miniaturely tedious. The primary objection is that a vessel two or three or five times larger in diameter presents tremendously more <u>surface</u> to be smoothed and polished. What is the formula for figuring the area of a globe? We forget, but we find that we're suddenly saying good-bye to hours and hours of our precious time as we find ourselves with more "surface" on our hands than we can decently handle. (Also, larger pots lead to future troubles, but we won't go into that at the moment.)

So we get really hot at molding, Little Flower and I, and studying lots of photographs we believe we see a good deal of molding in primitive pots. Inspection of a few of the actual vessels definitely shows us body-joints and neck-joints, mostly carried out and finished much more nicely than ours, but we do occasionally buckle down and seriously attempt to hide our seams, by working the "leatherhard" pots more completely.

Although we've become lazy and slipshod from using commercial stoneware and other readymade clays in the past year, building really "pretty" shapes with these easily

working clays, we still revert to the coiling and molding of local clays, upon occasion. The reliable stoneware pastes cause us to become careless, and we must tighten up and use much more caution with the local muds.

We've learned that the "coil" method has some bad faults, mostly due to our carelessness, we believe, wherein cracking appears between the coil joints and sometimes in the very bottoms. We are surely not able to exert the heavy pressure during the smoothing operation (upon coiled pots) that we are able to do with molded objects, but a recent 2-3 week run at "corrugated" vessels (the pretty brown cooking ware of the Southwest) teaches us a new lesson. These pots are coiled to shape, then the inner surface is pinched and smoothed. The outer surface is sometimes pinched, sometimes treated in other decorative manners, but is never smoothed, and the results for us have been great. No coil-joint cracking, although there is no pressure exerted from the outside at all! The walls can be made fairly thin (this is a trademark of the coiling method, in Leon Plain ware), the pot usually seems lighter in weight, and no doubt the corrugated finish works somewhat like a car radiator in the exchange of heat, during use as a cooking vessel.

Using the stoneware clays, we have built successful double-spouted vessels with the big loop handle connecting the spouts, flat-topped seed jars (a rare experience, using a soft clay which likes to collapse on you), as well as tall tubular vases, large wide-mouthed jars with a variety of rim-finishes, jugs, ollas, everything except effigies and figurines. Our choice of manufacture is, of course, the molding method, but quite a few shapes require coiling, things with odd shapes or very large sizes. Sometimes we mold a shape and then add coils to it, to achieve more height or perhaps a more unusual shape.

We are not always this brave with our local clays, and so our pots of those muds tend to be rather ordinary in shapes and sizes. But throughout we tend to stay very close to the rounded, globular patterns, seldom straying from those forms, and believe we do so from sheer necessity.

We have done very little work at the other favorite primitive manufacture method, which is called "paddle and anvil", but have given some thought to it and have decided that it must have great merit. A rounded rock is held inside the thick, "preform" pot and the outer surface is beaten with a wet paddle, thereby thinning the walls, shaping the pot, and exerting the pressure which tends to compact the clay and firm-up the vessel. By adding up to 50% of commercial stoneware paste to our black gumbo, we are able to produce reliable pots which hold together nicely, but which always fire out to the dark cores found in the straight gumbo vessels, and find that the surface colors do not vary that much.

We have never tried wheel-turning, nor have we ever seen the method demonstrated. Indeed, thinking back, we have never seen a single pot made, by any method, and no doubt we're in for an afternoon of delightful fun when we eventually are invited by some primitive or modern potter to observe the action!

*Afterthoughts: Sometimes Little Flower and I find ourselves out in the open, away from water, holding a freshly-made po , admiring it, when we suddenly notice a flaw at the rim which needs a final tough-up before setting the vessel up to dry. We lick our fingers, smooth the flaw, lick our fingers and smooth. We feel that this is a natural move and it also produces a recognizable effect. With this sort of wet-finger (or wet-hand) smoothing, the bone particles near the pots' surfaces are more exposed and tend to dry-out in this exposed manner. A wiping wet sponge produces the same finish, except that the dried surface of the vessel is usually rougher and grainier, than with the "soft" wet-hand method.

*A very slick polishing tool produces the opposite effect, often burying the temper particles deeper into the clay body and tending to cover them with a thin layer of "slip-like" clay. At the start, we were worried when the wet-hand smoothing metod exposed the crushed bone fragments, but soon learned that the protruding bone always burned off flush with the surface, and the finished product usually ended smoother than it had been before firing.

*Since we've never seen a single pot made, aside from our own, we are not equipped to hold forth at any length upon the subject of manufacture. The "good books" on pottery-making are full of brief descriptions and illustrations concerning the various methods of forming vessels, but it has been our experience that a beginning, "primitive" potter will mostly ignore the printed materials and learn, the hard way, just how far he and his local muds can go together toward creating artifacts which will prove the most dependable throughout the entire process.

*If we ponder the imagined shapes and sizes of the pots produced by Little Flower's people ("reconstructions", since we've managed to recover very few pot-fragments of sufficient size to clearly indicate her folks' preferences, we find that they usually run small in size and rounded in shape. Guesses would be toward little bowls with parallel or convex-profile walls, rising from a slightly rounded bottom, and larger olla shapes which constrict an inch or two below the rim, to flare out above the construction. Handles are mostly attached so that the upper end of the loop flushes near the rim and is smoothed flowingly into it. A number of recovered handles, as well as fragments of the adjoining walls, indicate that a pre-made, pre-dried rivet or plug was inserted between the top two wall coils and allowed to protrude from the outer surface of the pot, the inner flush end of the rivet later being covered with a thin layer of clay during the smoothing operation. The handle is then shaped from a coil of clay and attached to the rivet at its upper end, with the lower end of the loop smoothed onto the pot wall. We tried this riveting method a time or two, fully expecting our pot wall to crack at the rivet with drying and shrinking. This did not happen, and those handles are now very strong and firm, and seem to be able to endure much abuse.

DRYING

Again we encounter a critical state in the pot-making process. Without the utmost care, we will expect to lose an embarrassing percentage of our output to drying cracks, particularly with those items made of local muds. The commercial clays which we've used dry much more reliably, but this tendency (as we've mentioned) prompts us to become careless when we turn to a weekend or purely local-clay manufacture.

When does a pot become dry, and how do we know when to build the fire? If there is a surefire method for determining "dryness", we have not discovered it. The simple truth is that no two clays dry at the same rate, and even when things appear to be completely bone-dry, we will still occasionally blow them all over the yard. There are also other factors involved.

Most aggravating, probably, is a long spell of high humidity, with fog, mist, drizzle, rain, or just merely cloudy days preventing us from allowing our damp pots the hot sun and dry breeze which they always need if they are to get anywhere near "dry". If commercial clays may immediately be set outside in a shady breeze to firm-up for a spell, the local clays cannot be soon exposed to breeze, or even reflected sunlight, if any sort of success is to be hoped for. We have learned to cover our brand new pots made of local muds with plastic film for a couple of days, to allow them to firm-up. Sometimes we even place a prized new local-mud pot in a tightly covered plastic "refrigerator storage" container, often forgetting it for a week or ten days. This little pot will often be found covered with a blue-gray mold, but we almost

always are able to produce crack-free, finished vessels by this method.

As soon as a pot can hold its own weight fairly well, we prefer to place it in a suspended "hammock" of cloth so that its curved bottom and walls may be allowed to retain their shapes until a leather-hard condition is reached. They are then placed rim down upon a rack for better circulation of air for two or three days, until finally being moved, rack and all, out into the warm, breezy sunshine.

We have kept pots inside for periods of 4 or 5 weeks during spells of high humidity to later allow them 2-3 days of sunshine which may or may not get them ready for the fire. Once we make a small thin bowl and successfully fire it in just over 24 hours from manufacture, without it ever seeing the sun. On another occasion we build two medium-sized bowls, slip and rock-polish them on the third afternoon, paint designs on them that night, and get beautiful fire-outs with them the fourth night.

So we never recognize a strictly "ready" pot; but, we soon learn to assist nature in the drying process, and sometimes in rather short order. The very first method, practiced during a spell of muggy weather late in the first summer of the experiment, is to place several near-dry items in the kitchen-stove oven early in the morning after the lady of the house drives off to teach school. We set the oven on about 300° of "preheat" and then remove the pots when we get home for lunch, after 4 hours of gentle heat. This works wonderfully for several weeks, until the broiler element destroys itself after a spell of 600° preheat. Little Flower and I are thus caught red-handed, and the bill runs something over $15.00. Naturally, we abandon this expensive practice!

During the colder months, we find we can get good, fast dryings by stacking our little pots on top of several of the gas heaters inside the house, Again, we run into a little wifely abuse and misunderstanding, particularly when we go off to work and leave one heater burning with no one in attendance.

Another summer comes along and we rig a spectacular dryer inside a drum, using a small electric, fan-blown heater. We eventually abandon this method, however, when the electric extension cord suddenly bursts into flame one day in the garage, just as we plug the contraption in. Realizing that we've just about stretched our luck to the hilt, we cast about for a more reliable method of "quick-drying", and come up with the absolute answer, safe and dependable and no doubt practiced since earliest time.

By building an outside fire and setting our pots near it, turning them occasionally, we arrive at a satisfactory drying method, which we later refine to the extent that we are often able to proceed directly from "quick-drying" into actual firing with no hesitation. Sometimes, however, we allow a full night of slow heat on a rack over a low fire, or perhaps two nights if the pot is particularly precious. This amounts to 6-12 hours of "bar-b-queing", and produced sometimes really pretty little pots. Vessels which have received several hours of this treatment are noticed to become dark brown in color, assuming a slightly "glistening", moist appearance, and usually give not the slightest trouble in firing if temperatures are raised slowly and carefully to the peak.

Incredibly, a pot given the above treatment and which is beyond doubt dry enough to fire, will sometimes blow sky-high a day or two later. The dried pot is a blotter which soaks up moisture at the slightest opportunity, and high humidity will apparently furnish enough dampness to re-dampen a dry pot. For that matter, a dry pot left outdoors overnight by accident to encounter a heavy early morning dew, will literally fall apart in its maker's hands if he unthinkingly picks it up rather roughly near the rim!

Drying cracks sometimes appear with no good reason for their happening, and some of these seem as if they might easily be patched. We've tried several ideas at patching cracks, the best probably the stirring and muddling of the crack's edges, attempting to melt a little patch of clay and flow it into the crack; but nothing works, so we soon forgot this notion. One night we bring a pretty, apparently dry, incised bowl of local clay into the house. The temperature is about 70°, the humidity about 90%. During the night a freezing norther blows through, with the humidity dropping to rock-bottom. The next morning our pretty bowl shows over a dozen rim-cracks, some of them two inches in length!

A "drying crack" is recognized by its rather aimless, zigzag wandering. We're convinced that a good percentage of prehistoric pottery suffers this cracking and will be later fired well to become a very usable product, if the cracks are not in the areas of coil-joints or "seams", where a circular weakening of the vessel wall will allow it to soon fall apart.

During the earliest part of the drying stage, pots may be carefully bent or warped from their original shapes into possibly more "charming" forms. We use this method of shape-change, now, and then on occasions when our "vision" tells us that a rather ball-shaped pot might be more effective if a portion of it is manipulated into a "cone" shape, or if the circular "mouth" is stretched into a triangle, rectangle or oval. Improvization provides excitement, and the very earliest drying stage allows all sorts of last minute fun.

We suspect that drying pots serve as a sort of highway for the added "manufacturing" water, with the moisture always traveling downward through the clotted clay and the added temper grains. For this reason, we invert our pots on racks upon their rims (when shapes permit) and find that they seem to dry more evenly. Jug-shaped bodies, with long narrow necks, or globular bowls with very small "mouths" are the very dickens to get dry, and we assume this is due to the scant inside circulation. But exposure to sunshine and a very dry breeze works wonders with all shapes.

When our pots become husky-dry, we often trim them with a sharp knife and finish them with sandpaper. This is easily accomplished with the commercial clays, which dry to a rather soft, easily sanded finish. With black gumbo it is another story, particularly if a slightly snady clay has been added to it. We can knife-scrape this material fairly well, just before bone-dry, and if we're really alert we go right ahead and polish its surfaces, but if we choose to wait for the bone-dry stage, to then sand it, we find that there is no sandpaper made which can cut it. The sandpaper soon wears out and our pots appear untouched.

* Afterthoughts: We have learned that perhaps Little Flower's people were absolute wizards at pot-drying, from the recovered broken sherds at local campsites. But we wonder how they managed to nurse raw pots through the frequent thundershowers of spring and early summer here, without a dry garage to store them in.

*The "good books" tend to bear out our findings about "drying", explaining that the very outer surfaces of a pot tend to dry rather rapidly, enclosing a more slowly drying core which then has difficulty in allowing its moisture to escape. As the layers of water between the clay particles evaporate, these fine particles draw closer together and shrinkage results. Rapid drying may be practiced with some clays, but this must occur very evenly to avoid putting the pot's fabric in severe tension, else warping or cracking will result.

*The dry strength of certain clays varies widely; a porcelain clay body will be very weak, while a "secondary clay" may firm-up nearly as hard as a rock. "Black" ball clays have a high dry strength, partly due to their fine grain, but also due to their

lignin humus (organic wood tissue) content. The form of a pot and the technique used in making it will definitely affect its dry strength; a bottle or other well-rounded shape has greater resistance to stresses than a slab shape or a dish.

*The experts test for dryness by covering the "mouth" of a fairly well-heated pot with a pane of glass, watching closely for any moisture to form on the inside of the glass. Little Flower and I have not tried this test, but we have noticed a definite moist "feel" to some thicker vessels while heat-drying them, and our suspicions have been later proved correct when the pots sometimes scattered all over the yard while being subjected to the inferno!

DECORATING POTS

Although Leon Plain shows a dearth of decoration, we two novices soon become weary of looking at little ordinary reddish-brown bowls and ollas sitting all over the house, and we begin to think "pretty".

The first "decoration" we attempt is to simply polish the surfaces of some of our "smoothed" but yet somewhat grainy pot walls. We practice this upon hard-leather objects, tolerably firm but becoming lighter in color, the black gumbo beginning to turn toward that recognizable "meatloaf" hue of bone-dry condition. Our first polishing tool is a small obsidian core with one nice flat one-half inch facet. After many weeks of use this facet becomes mirror-like but badly scarred by tiny striations, and we are forced to abandon the tool when it begins to "smear" the damp clay, rather than to polish it. This core, incidentally, closely resembles comparable artifacts recovered from Mexican prehistoric pottery sites. We believe the above "smoothing" of the just-before-dry pot produces the very best results, serving to firm-up the pot walls, probably by pressing the fish-scale fine clay particles into very close overlapping alignment, but at the same time offering the core of the pot a more difficult obstacle through which to get rid of moisture, calling for a longer, more careful drying period.

However, the above method of smoothing requires that we stay very close to our pots at all times, to catch them at just exactly the right stage, and since this is often impossible, we soon learn to polish bone-dry vessels with wet tools. This is a tedious, time-consuming chore, wherein a square inch is carefully polished, then another, slightly overlapping the first, and so on. Really incredible results are produced, especially if we double-polish each square inch, and we hear that raw pure chicken fat may be substituted for water to produce the most magically reflective sheen of all.

Eventually we become involved with scoring the damp vessel walls with some sort of pointed device, scratching shallow lines and swirls which sometimes create a more startling effect to the appearance of our pots. Fingernails or sticks or anything else, nearly, can accomplish this "incising", and little pressure is needed, since the skimpy scratching will later jump out at us after firing; for that matter, unwanted scratches are the very mischief to get rid of, upon dry pot walls, and for this reason we caution the cutting of fingernails and the practicing of very smooth, fluid motions with our hands, while building pots.

Following incising, we practice "stamping", "indenting", and numerous other wet-clay manipulations with various lively improvements to the pots' appearances. We go really berserk with a common plastic picnic fork, looping and swirling, or attempt neat and precise triangular impressions in concentric circles about a pot's shoulder. There is no limit to this form of wet-clay decoration, except our lack of imagination.

Incising leads us to experiment in scratching designs into the surface of a fired pot, to affect a really beautiful decoration called "engraving". The designs may be similar to incised figures, but the ultimate appearance is entirely different, particularly if the pot's fired walls are dark and its core is light in color. The incised figures fire to the same hue as pot's surface color, but the engraved lines come through in a two-toned effect.

We learn to shape thin strips of clay into designs, to press these "appliques" onto the damp pot surface. Sometimes they stick tenaciously, sometimes they come off upon firing, and no doubt our technique lacks something.

About here, the "artist" potter becomes aware that he is not operating upon his ordinary "flat" surface anymore. Our "canvas" of smoothed sand, or possibly the limestone wall of a rockshelter, has suddenly become a globe, and no matter how we turn it and up end it, we can clearly see only about 2/5 of its surface at any one time. This inspires us to draw upon inner resources, involving all manner of geometrical processes which are usually abandoned in desperation, to rely entirely upon guesswork and "eyeballing". The results are often better than we'd planned, with primitive, description-defying designs resulting. Some folks classify these as "charming", which is rather generous, we think.

If an entire pot cannot be fired from certain "local" clays, we nevertheless learn to be on the watch for new fired colors from them, and then we thin these muds into a watery, creamy "slip" with which to coat our more reliable but rather drab dependable clays. We store these exotic, bright-firing slips in fruit jars and use them faithfully, polishing them for hours upon end for a hard surface finish and a bright sheen. In an attempt to avoid this tedious work, we try further-thinning a slip, applying it to a pot-wall with a sponge as a sort of watery "stain" with no further polishing practiced. This is not bad, but not very good.

We eventually solve the "polishing-of-the-slip" chore by painting small 3 inch patches of ordinary slip on the pot walls and immediately rubbing this damp mud with a soft dry cloth. This produces a semi-polish (which may be further pursued by hand-rubbing), and is much faster to accomplish. A remarkable surface effect is possible by using a slip which contains numerous small gravels, as the rag-rubbing rolls the little grains about the pot walls to score and groove the finish into an "antique" effect. However, we find that any attempt at "slipping" does not compare in "lasting" effect to the polishing of the original hard-leather pot wall. With use and rough handling, the surface of our slip will become scratched and bruised, not to the point of cracking and peeling, but to merely becoming slightly unsightly.

Sooner or later we determine to attempt the most beautiful decorating method of all. We study color photos of Southwestern painted pots, chew up a yucca leaf, grind up a few "paint rocks" of various colors, and have a go at it. After a year our painting has progressed to something which might be called "casual" in design and technique, but the results are awesome! This is "pretty" at its ultimate, with our raw, slipped, polished and tediously painted vessels suddenly becoming extremely precious, and we at last learn the pottery "facts-of-life", if we have not suspected them before.

These "pretties" must soon be subjected to the operation which seems bent entirely upon their malicious destruction. We now learn the meaning of "the moment of truth", and we wonder seriously if a dread of the next step affects how much "beauty" we will attempt to build into our helpless little pots. If we built before with the suspicion that our things were headed for an almost certain wreck, we must now carefully calculate our every move in the "game", during all the critical phases listed above, to more perfectly insure that we will now be successful.

People cry, "You're not going to try to fire that!" We could, right then and there, legally back out, handing them the nearly-finished jewel to be placed upon a shelf in all its splendor. But that doesn't get it, friends. The final step calls for the simple immersion of the helpless little pot into the fiercest fire-storm we're able to create, and if we once back-off to "save" 30 hours of hard perfection, we might as well put up the tools and go home.

*Afterthoughts: The "good books" describe and illustrate numerous decorative methods, but Little Flower's people mostly chose to produce the plainest little ware imaginable. They very rarely practiced incising, apparently never tried engraving, painted only upon occasion and "slipped" with great reserve. They must have painted an occasional pot, after firing, with the red ochre which decorated many of their other artifacts. This "wash" is sometimes discerned rather faintly upon sherds, grainy-surfaced tools, and even upon the very bones of their buried dead.

*We've no idea why the local late prehistoric aboriginal folk mostly tended to avoid even the more simple forms of decoration, unless the time required for such beautification did not fit into their rather tight schedule of earning a living as they moved in South Texas.

FIRING

This is it. This is what it all boils down to, and we begin by subjecting our first vessels to the most primitive, basic flame in the book, a nest of split, dry timber which will likely barbeque a steer. Fortunately, we've "dried" these objects for a month, and have intuitively decided to further "dry" them on a rack over a low flame, before the furnace blast, else we may abandon the project right then and there, for good.

The percentage of survival from that first series of infernos is now classed as phenomenal, and to be sure we've really cooked them to a crisp, we subject them to second, third, sometimes even fourth fires. We see just plain old dry, shaped dirt become red hot, to glow in the night like an incandescent lamp, and sometimes believe we can even discern the flickering flames through the pot's flowing body! Little Flower and I are entranced by the spectacle, and prefer to fire at night, to this day, whenever practical, to better observe the peak of the operation.

But often consumed with the intense excitement of the "show" and impatient to observe the end result, we sometimes recover the glowing vessels from the very living fire, and are shocked to see them become fragments before our very eyes. Actually, we never really see this happen. The rapid-cooling, shrinking shock occurs in the flicker of an eye, with rather straight to slightly curving, sharp-edged cracks riddling the pots to immediate destruction.

Perhaps more unnerving, however, are the explosions which sometimes occur during the very early, building stages of our fires, the reasons for which we cannot comprehend at that time. Rapid stacatto pops are heard, like a string of firecrackers, or sometimes a single massive blast, which seems to lift the "nest" of fuel and to stir many small sparks into rising flight. We soon learn to recognize the difference between these sickening sounds, the sharp cracking of burning wood, and the little tinkling chimes emitted by the heating, expanding pots.

If we've blown one pot, we've blown hundreds, and we've even suffered the indignity of seeing several pots blow fragments completely through the walls of their neighbors who seemed, at the time, well on their way toward enduring the ordeal. Gusty winds sometimes stirred our open fires, penetrating the flames to caress perhaps just a small portion of a pot, cooling it quickly and shooting it full of cracks.

One quaint demonstration is recalled, wherein we decide that if the vessels are to end up in flaming coals, why not start them there and save time! This bed of coals must be the very hottest phase of an open fire, and we heap them lavishly over our pots. That a very few survived this treatment is now unbelievable...the survivors always showed areas of "bloating" and perhaps a hairline, criss-cross cortex-cracking which we term "heat-shock", but which we now believe to have been merely the verging of our local muds upon their "melting" temperatures.

Upon viewing the destruction we're practicing upon little test bowls, our interested colleagues Drs. Hester and Shafer immediately call for "cooler fires". This plea sends me and Little Flower into gales of amusement, and we snicker, "How do you build a cool fire?", meanwhile thinking back over our various firing experiences for a clue.

Recently Margaret Beadles, the talented Kerrville ceramicist, took several of our gumbo bowls off to "melt them at less than 2,000° F". She shipped them back to us in various states of disrepair, with complete awe for the results. "I want some of that clay, and soon!, she allowed.

One bowl was deliberately broken before firing, for later comparison with its remaining portion. This particular pot was a mixture of the early "refined" 41DM70 material and several other local clays, was carried to a temperature of 1830° and showed perhaps a slightly redder color-change and considerable hardening, with absolutely no further shrinkage. Another was taken to nearly 1900° and showed a "bloated", cracked area on one side, but otherwise was considerably improved. The third was elevated to a magnificent 2200°, where it sagged into an elongated shape that suggested it might have been set upon one edge for the test, turned to an unbelievable dark reddish-brown and came out as hard and ringingly crisp as iron, with absolutely no drooling or dribbling. The latter two pots were of pure, bone-tempered gumbo.

We immediately inspected our super-heated pots, searching for the dark cores that we had fired into them originally, predicting this dark color would have been erased by Margaret's clean electric, enclosed heat. Sure enough, the black was gone, replaced by the similar reddish wall-tint, and we've never managed that even with second or third "open" firings, with black gumbo.

We wonder just how hot our various open fires have been, and begin a detective process which might give us some clues. Early in the experiment, Al Guerra of "Tonicraft" views some things which he believes have reached 1400°. Soon afterward, we insert an 018 cone (a small pyramidal piece of clay which will bend near its pointed tip at an exactly predictable temperature, in this case 1330°) into a rather ordinary fire and literally melt it to a pool of molten glass. This surely confirms Mr. Guerra's 1400° estimate. The little gumbo bowl which Mrs. Beadles causes to bulge and crack with small crazing patterns, at a temperature of 1900°, resembles those early products which came from the "glowing-coal" fires. There now remain some 500° to be accounted for, and we're just about positive we have run that scale almost from end to end, not really being able to build uniform fires or to neatly enclose them within a heat-controlling chamber.

We dabble a bit with commercial glazes, including glaze-paints, most of which call for a peak heat of 1860°. One fire will not touch these glazes, although the next will meet them to perfection, while another will literally destroy small portions of these painted designs, leaving the remainder in pretty good shape.

Although we're now cooking by a method which seems to give us more uniform temperatures, we are never sure just what might emerge from our overnight fires and are often elated with the results. If certain pots do not reach the peak heat we have hoped for, we simply return them to the furnace until they do.

There is something wild and savage about a raging, full-blast fire storm of dry, split mesquite; enclose it slightly and we sometimes fear for our very lives, should it manage to escape and capture us. Little Flower's folks were no doubt the world's greatest experts at simple "fire", storing within themselves the accumulated lore of countless generations of ancestors, a profound knowledge which we have now lost.

We begin to notice, fairly early, that certain predictable happenings take place within each and every open fire, that these fires seem to develop in "stages" and to wither away in "stages". A dry pot is set, rim down, upon a bed of fuel, and then more fuel is stacked around it and over it. The fire is started at the very edges of the pile, as evenly all-around as possible (with a wind-break in place to frustrate the damaging breeze), and it is hoped that the entire nest will burn cleanly and uniformly. If we make no mistakes, our just-started fire will commence to grow with stealthy slowness, smoking heavily and still burning at a considerable distance from the enclosed pot, so that it does not heat it too rapidly. We call this the "cool" portion of the fire, as it steadily but gently heats the pot through the first disastrous step of its journey. As the flames grow larger, begin to dance wildly and to ignite the entire outer surface of the nest, we can begin to breathe a sigh of relief, because our pot now passes the first test with flying colors.

About ten minutes later, more or less, depending upon type of fuel and whether or not it is rain-dampened, our fire begins to catch at the very bottom (underneath the pot's rim) and to penetrate into the covering nest itself. Still leaping wildly and smoking heavily, it begins to enter its second stage, with the entire bundle now aflame and the smoke seeming to abate. At this point we observe the first reaction from our pot. It is slowly and delicately turning to a glistening black color. As this phenomenon develops we may begin to rejoice, because we are now safely past any "blow-up" and have only the rapid cooling, cracking wind-change to fear. This black, glistening sheen is not something which can be rubbed off later or washed off like soot. It is permanent, and is strikingly beautiful if the pot has been heavily polished beforehand.

What can possibly cause this black change? We've given considerable thought to it, and with a few clues have decided that it results from perhaps a final moisture-release by the pot itself, but more practically from a sort of condensing effect upon the pot's surfaces of released moisture and a bit of oil from the very living fire!

If allowed to complete its "phases", our fire will now begin to show ashes as its outer surface, meanwhile assuming a gas-fed appearance much like a clean-burning blow-torch. No smoke is visible, and the interior of the fuel nest becomes a "box of fire". The terrific heat which is now generated produces a progressive fading of the pot's black color to a reddish black, to a dark red, and finally to a bright glowing red. If there is enough fuel left unburned, we will hope for 20 minutes or so of continued red heat, enough time to thoroughly penetrate walls under 1/4-inch thickness and to finish the job. This phase if obviously the peak of a strictly open fire, the period from which we reap its rewards.

There soon begins a cooling stage, as the fire dwindles and becomes ashes. We desperately hope that our ashes do not completely disintegrate to leave the pot standing there bare naked with no protective covering, and more often than not we're lucky. A theoretical fourth stage now occurs, with the profuse ashes tending to cover and smother the final glowing coals, to produce a slight darkening of our now hard-fired pot as some little bit of "reduced atmosphere" is generated. (You probably thought we'd never get around to mentioning "reduction" and "oxidization"!) As to the "oxidization-reduction" problem, we are not sure that these terms exactly fit into the scheme of our open fires, which are laid and lighted on the absolutely

wide open prairie where all the air in the world is available. To be sure, a primitive fuel (wood, cow chips, grass, whatever) cannot ever theoretically burn with a complete absence of reducing, sooting atmosphere. However, until we are convinced otherwise, our terms will tend toward "soft-fired" (for the brown or black pieces which will melt into puddles containing thin slivers of hard, dark crust) and "hard-fired" (for those things which have achieved glowing red heat and which will not melt under almost any circumstances.)

We now practice a semi-primitive method, forced upon us by the combinations of factors which have harried and defeated us in the past. To avoid wind gusts, we secure an old heavy steel drum, open at both ends, not as tall as an oil drum but nearly twice as wide. This convenience allows us to cook during almost any breeze. In fact we now prefer to fire on a cold, windy winter night. The combination of low humidity plus the stiff wind seems to encourage a fire to give us the husky, tinkling pots we desire.

We play around with this contraption, boring holes in its walls and setting bolts at different levels to support a firepan (a large circular plow disk) and a rack (a piece of 1/4-inch concrete reinforcing mesh). These are moved around for several firings, closer together, farther apart, and eventually our little pots begin to emerge very cleanly-fired, mottle-free, "oxidized" as they say. We play some more at propping the thing up on large rocks to allow more air to get to the fire from below, and suddenly we're building great roaring, long-lasting fires which begin to occasionally melt glazes. We go further by devising a flat lid with a handle, to move over the upper opening and to direct the flame better, and perhaps to trap a little more heat. (This is <u>not</u> a kiln. We're now cooking in the very dancing flames, no longer in the "nest" of fuel, yet our pots still go through the same phases as before, turning black, then red, then cooling relatively slowly.)

We can also use this drum as a "heat-drying" device, by building small fires and setting our pots upon asbestos stove-burner pads on the rack, making sure that no single flametip touches them until we feel they're "ready". Usually after 30 minutes of good hot drying, we remove the asbestos pads, place the pots exactly over the spot where we believe the fiercest flames will occur, cross-hatch as many thigh-sized split mesquite chunks on the coals underneath the rack as we possibly can, and jump out of the way, because our fire is now beginning to roar.

If we're cooking a rather thick-walled, larger vessel, we will stack more pieces of smaller mesquite around and over the pot, on the rock, or perhaps use cow chips if we are aiming for a more beautiful fire-mottled finish. Sometimes we simply invert an old bucket over the pot, hiding it from view of course, but thereby maybe trapping a few more degrees of heat. We will also sometimes stack a little mesquite around the bucket itself.

We watch every single fire for every minute, through its peak "red-hot-pot" phase, until the flaming logs begin to crumble, then we turn in for the night, to go out early next morning to inspect our products. We listen closely for the popcorn sounds, early in the fire, which will indicate the blowing-off of the small circular spalls from the pots' outer surfaces. We seldom hear the great single blasting explosion any more, where perhaps half of the pot is destroyed from the rim up into the body. But, we still hear it often enough!

If we're convinced that a batch of new pots is ready for intense heat after 30-45 minutes of drying, we are usually through (past the peak 30 minute red-hot-pot phase) within 1:15 to 1:30 after building the first small "drying" fire. And, the pots are usually cool enough to remove within 6-8 hours of that first little fire. This seems like very fast action to the modern purists, who stretch their heats out to 24 hours

or more on occasion, but with extreme care the process will work every time. If we're nursing a particularly precious, highly decorated vessel along, we might extend our "heat-drying" time through two nights, or 12 hours of barbequeing. These objects become very dark brown, the paint is obliterated, and we sometimes deliberately make pots which will be given only this treatment, to later be engraved.

If we want to really complicate things, we might cover one painted pot with a bucket for a clean, "oxydized" finish, place another vessel beside the bucket and cover it with cow chips for a pretty, fire-mottled hard-fired effect, set another raw pot near the edge of the rack for 6 hours of "browning" (to be later engraved) and place another once-fired "corrugated" vessel next to that last one to be "browned" to the classic Mogollon hue. Then we place our flat lid over most of the upper drum opening, set a rack upon it, place several bone-dry pots on the rack, cover them with a big inverted washtub whose edge extends over the exhaust-opening, and trap several hundred degrees of rising heat for 4-5 hours, to heat-dry them! All this with one simple little mesquite fire.

Of course, if something blows, we are not really sure what it is until the next morning. We know that it isn't the "browning" pots, because they never blow, or is it likely to be any of the things drying on the lid, since no flames are touching them.

Dry split mesquite is our champion fuel. It rises to extreme heat fairly slowly, burns long enough to completely red-heat the pots through and through, then crumbles to flaming coals which continue to generate tremendous heat for several hours, allowing the pots to cool slowly. Dry pine is a tremendous flash-heat fuel, but does not last long enough, and produces a resinous smoke throughout its brief burning which tends to discolor the pots, then dies to skimpy ashes rather rapidly. Green pine and creosoted pine (old telephone poles), and sometimes damp, rain-soaked "cured" pine, are atrocious. These burn with a great billowing of greasy, black smog, depositing heavy soot upon cooling pots and "cooker" alike, producing a grayish Rockport-like finish to hard-fired vessels sometimes, and generally messing up everything. For that matter, green mesquite or "damp" cured mesquite will produce bizarre effects, usually darkening a polished pot to a pretty, dark-chocolate brown while leaving the glaze-paint very clean and bright.

The most unusual fuel has to be dry cow chips. Unfortunately these delightful items do not occur in such dependable quantity, in this country, as do big mesquite logs. We have burned 3-4 pickup loads of them, however, and have found them to be nearly foolproof, if carefully and evenly started. The peak heat of these rather pleasant, grassy-smelling items is absolutely fierce, producing the softest, most gentle blue flame we've ever seen. The final bonus is the fact that the feather-light ashes still hold their original shapes and their positions within the "nest", providing a slower and safer cooling "box" for the pots, protecting them from the breeze.

Tiny trapped air bubbles, in the pot's core, begin to swell rapidly, and if a series of these hollow spots are accidently built into a seam at a neck-joint or body-joint, there will be some really great "whoomps" occurring rather early on. A tightly-polished wall, slowing the pot's drying process and actually re-dampening it from the wielding of the wet polishing tool, will sometimes fool the potter. He will go into a high-fire situation before the pot is ready, and the popcorn-chattering begins very soon in the process. Very thick pot-walls are also slower to dry, and sometimes even a "ready-dry" pot will shed spalls as its outer surface begins to super-heat and expand while its core is lagging far behind. These latter fractures are usually big things. (We mentioned the "moisture-blotting" effect earlier, where high humidity seeps into an absolutely dry pot to cause its destruction, if this fault is not suspected and corrected ahead of time.)

After firing, our pot is the dryest it will ever be, unless re-fired at some future date. Its color will gradually darken for several days as it takes up moisture, and its original chiming, finger-thumped tone will deteriorate from a sharp "tinkle" to a slightly more "wooden" sound after several weeks. If we ever learn to produce open fires which will dependably melt a simple, firm glaze, we will move into a new world of potting where atmospheric moisture will no longer affect our simple fired earthenware vessels; but this accomplishment is still considerably out of our reach at present.

Large pots (a foot or more in diameter, 16-18 inches tall) are a puzzle to us. They do not fit into any fire we are able to construct. There is said to be no difference theoretically, between firing small to medium sized vessels and large ones, but we have yet to decently adjust to the very large items. This is a definite must in future months, to learn to build large fires.

*Afterthoughts: With all the gradual improvements to our firing methods, we still seldom surpass the skill of Little Flower's people at cooking Leon Plain pots. While ours are fired to predictable clean, hard (oxydized) finishes, or to mottled or browned or various other desired endings, her folks seemed to have clung to a sort of open "brush" fire method which produced pots of striking similarity and durability. We were delighted, a year ago, when our interested colleagues declared that a few sherds from a new bone-tempered, reddish, dark-cored, fire-mottled gumbo vessel appeared to be "as good, if not better, than average Leon Plain". They attempted to break sherds with their hands, and could not manage it. Since then we have improved upon that one little vessel, and very recently we constructed and dired a large bowl which rings like a church bell!

*Another triumph: Dr. Dee Ann Story once studied a carinated, 20-hour-barbequed dark brown bowl. It was similar in shape to many of the Caddo bowls and was engraved upon its upper shoulder with a pretty fair reproduction of one of the illustrated types found in her very own Handbook. She asked questions, frowned, and finally said, "If I had dug this bowl from a mound at the Davis Site, I would have never suspected it to be a fake".

*Back out at Little Flower's camp on Tortuga Creek we are puzzled and frustrated that we have never recovered a single circular, feather-edged blown-off spall from this or any other pottery site. An indication of complete mastery of the building and drying processes by her people, or perhaps telling us that pottery was, after all, not manufactured at a single one of the sites? The usually very thin walls of the many sherds recovered might indicate that her people were able to nurse pots through without a single explosion, but this seems to us a rare perfection in firing. If we study the very edges of these sherds, what do we find? Many edges appear slightly ragged and zigzag, indicating either original drying cracks or the accidental breakage of finished pots which had already been put to use. We may be able to determine the cause of these wandering fractures by searching for an exposed dark core. If the core is visibly dark, the breakage was a post-firing accident. If the core is the same shade as the nearby walls, then it definitely cracked while drying. The latter clue may be double checked by breaking off a small corner, looking for the dark core.

*We may find a sherd with one red edge and three dark edges, and imagine that a fired pot with one or more drying cracks was put to useful purpose, until rough handling finally finished it. This can be expected...we now use many of our little pots, which cracked while drying, as planters, outdoor ashtrays, etc. The large pieces of such a broken pot will later be trampled and further broken by many means into the small sherds we surface-collect today.

*Looking further, we find a goodly number of fractures which are straight to slightly curved, with very sharp smooth edges, suggesting that our local potters could have had

their greatest trouble with protecting their fires from gusty breezes, or that they might have impulsively removed some vessels from the ashes much too soon. These can show either dark cores or red-fired edges. The dark core will indicate the instantaneous cooling-cracks after hot-pot removal, the reddish edges will tell us that the pot cracked apart during "peak firing" and the fragments still in the fire, continued to cook and "oxydize", edges and all. One of the sites on Tortuga Creek produced semi-fired sherds, reddish in color but soft and crumbly, and we believe this to be a sure indication of local manufacturing of Leon Plain pottery.

*The "good books" are packed with firing information, mostly inclined toward the enclosed, controlled kiln-fire. However, if we read some of this very carefully, we can begin to filter out much information which might aid us in better understanding the reactions between our own simple fires and the pots within them. We feel ridiculously "simple" upon learning that our "heat-drying" efforts produced a rather ordinary reaction. Water boils at 212° F., and all pots begin to steam rather briskly when they pass that heat, as the "added water of manufacture" is boiled away. The pots now begin to dry in all seriousness, and no particular damage can happen to them if they are not heated too rapidly. At about 400° the "absorbed" moisture (the thin, always-present slick which clings to each clay particle) begins to be driven off, accompanied by the first real wrenching jolt which the pot suffers. A rather rapid expansion is said to occur to the small amount of liquid, sometimes enough to break the pot.

*The clay body is also expanding somewhat, and this produces stresses which our rounded shapes seem to handle very well. At about 575° most organic materials burn out, and the pot heats steadily onward, with the black, glistening sheen probably beginning to peak at this time. Somewhere around 1000° the dark red hue begins to wash out the black surface sheen, and soon thereafter, at 1063°, the pot suffers its second severe punishment. This is due to the "inversion" of its quartz content, a straightening-out of the "crystal of silica" accompanied by an immediate linear expansion of up to 1% of the clay body. We never seem to have trouble here, but perhaps we do later as the pot cools back down through 1063° when the above "inversion" reverses itself just as suddenly. Successfully surviving the inversion of quartz, our pot continues to heat to a lighter red shade, and starts to turn into a "ceramic", or a state where the tiny clay particles are beginning to fuse to each other wherever they're in contact. This "sintering" action is fully achieved at 1475°, with a corresponding decrease in porosity and an increase in the strength to the pot's fabric, accompanied by some shrinkage. Our pot's color is now bright red, and to the best of our knowledge, this is about as far into the stratosphere as our "open" fires can elevate us. No doubt we reach greater heats in beds of flaming coals, but certainly not to the point of vitrification, where a glassy melting point is achieved. That Mrs. Beadles needed a yellow heat-color and a temperature of some 2200° to get close to vitrification with one of our gumbo bowls is truly fantastic, and tells us that we still have about 600° "safe" to play with, even if we can never hope to reach those temperatures with present firing methods.

*And if we get really good at it, we can still brazenly fire good pots in 6-8 hours, where the modern potters often spend that much time raising their pots to the quartz-inversion stage! And, no doubt, we will continue to scatter a few all over the yard.

*Comparing our really good-looking gumbo vessels to our similar stoneware pots, we believe we find that the gumbo vessels are much firmer, harder and more durable than the commercial-clay pots. Of course, the stoneware had never reached its required peak heat, which is several hundred degrees higher than our fires can attain, and so feels smooth and "soft" and scratches fairly easily; highly fired, it becomes rough,

grainy and terribly hard. The best gumbo pots, at our heats, seem to assume the high-fired "stoneware" effect with little effort.

POTTERY

We are unable to imagine all the uses to which Little Flower's folks put their Leon Plain vessels. Grease or oil storage might have been practiced. A "sealing" action is noticed in our own attempts at storing oils, stews, etc. Prolonged water storage, in the seeping little pots, seems unlikely. But, we recently built a coiled, thick-walled "jarro", at the insistance of several neighbors, to"hang with ropes in the shade where we can always have that cool, sweet dirt-tasting water whenever we want it". This gumbo water jug is heavy, massive, and holds just over a gallon of water. Undisturbed, it does not seep dry until well over a week after filling! And, after a couple of days of getting used to its "sweet dirt-taste", we now find ourselves going several times a day to the jarro, in preference to the handier tap water.

We plant flowers and succulents in a variety of our homemade vessels, set them out in the weather and water them regularly. They just keep going, and the little salt-tempered pinch-bowl, almost two years old, is as rock-hard as ever, as most hard-fired things, planted since then, seem to be.

We buy cheap, short-lived heavy Mexican flower pots, which usually begin to sluff away and crack at two years or so of weathering and watering. Painting a few designs upon them, we subject them to the very hottest open fires we are able to construct. These rather ordinary pots now seem much harder and crisper, and we predict five years of use from them.

A year ago, driven nearly to the brink from wondering if we can "cook" in one of our pots, we construct a globular, small-mouthed object of a local light-colored silty clay, in which we plan to boil frijoles. It holds just under a half-gallon of liquid, when fired, and we grease the inside of it heavily, fill it with water, pour in a cup of beans to soak, and plan upon an early morning cookout. Twelve hours later, we find that the pot has seeped away about one-third of its water. We chop some mesquite and build a fire for later flaming coals, pour off the remaining cold water and re-fill with boiling water, find that our bed of coals is about ready for use, and begin to cook. We fire-up the old lawn mower, make a couple of rounds of the yard, and return to inspect our culinary objective. The coals which are touching the pot are dead... drowned out! And the pot is less than half full of water! We race to fetch more boiling water, run to the woodpile to chop more mesquite and stack small chunks on the coals very near the pot's wall, watch the fuel begin to flame, and go back to the lawn mower for 2-3 more rounds. Soon we're running for more hot water and more wood again, and this incredible process goes on in a "Keystone Cops" scenario for 4 hours, until about noon, at which time we search through the icebox for a little piece of salt-pork, find the cupboard bare, and head for the store, hoping to negotiate the deal and get back before our pot either boils dry and/or extinguishes the fire completely.

After putting in about a half-pound of diced salt pork, a whole chopped onion and a couple of cloves of garlic, and 4-5 big fresh jalapeno peppers for garnishing, our seepage seems to slow considerably. So about 4:00 p.m. we decide our beans are cooked to perfection and proudly bear the finished aromatic delight inside for everybody's taste-testing. The pot is covered on the outside with ashes, underneath which we feel a squishy thick tar-like coating.

The family and friends find spoons and gather around for the great treat...but we suddenly see them frown and step slightly away from our pot of goodies! We urge them to

taste and admire, which they finally do, and declare our frijoles to be as delightful as any they've known. But there is a flaw; if we cook frijoles, we like to see them swimming in a pretty red soup, do we not? This view tantalizes the appetite and stirs the hungry family to action. But, our little "bean-pot" is fashioned of a grayish clay; the soup is as gray as a gloomy day.

Later, we lay another huge mesquite nest and give the little bean pot a second firing to "clean" it, since no amount of scrubbing can remove that outer greasy black tar. The pot emerges sparkling clean, if slightly discolored, and it sits on a shelf today with complete grace and authority, after a job well done.

A very few of the Leon Plain sherds which we've excavated or surface-collected (immediately after their being exposed by rainy erosion) are coated on the inside with a greasy, thick scum. We wet this sticky scum, scrape a fingernail through it, smell it, and declare that we are breathing the very smoky, greasy remains of a 300 year-old stew, very likely a helping of cottontail hash. It would be delightful if a good chemist might be interested in running tests on these sherds, to determine exactly what we are dealing with.

IN SUMMATION

Little Flower and I now agree that we have likely driven ourselves through several generations of "learning". The first year was very difficult in that we concentrated our efforts almost full time, day and night, upon solving as many problems as we were able to, and that our present output of 80% or better of successfully completed vessels must be attributed to the skills we acquired during that period.

If our contract did not call for reaching a highly sophisticated level, we have learned to appreciate the experienced techniques practiced by her people as they apparently undertook the problems of "potting" and quickly reasoned-out the solutions. Considering the time, the place, and the situation, we must bow to their obvious sharp intelligence.

But perhaps they had more help than Flower and I. There is a new, vivid picture being laid out which may eventually explain "pottery" in South Texas, where perhaps it has no business in being. We must consider, first, the part-time farmers up on the Plains, cultivating their crops and reaping their harvests for a portion of the year, producing pottery with riveted loop handles, and living rather sedately. But when their crops were gathered, they scattered out upon bison-hunts to further fill their larders, and spend considerable time at being wandering nimrods.

Some weird change must have occurred about then to induce the bison to reproduce themselves wildly, and to spread out in great herds to eventually penetrate the Edwards Plateau in sizable numbers. About 700-800 years ago, we discover that bone-tempered Leon Plain suddenly appears, in seeming full bloom, around the Plateau, accompanied by Perdiz arrow points and a collection of other debris which eventually is grouped into the Toyah Phase of late prehistoric hill country occupation. The thinking now coming into vogue is that these Toyah people are descended from the more northern Plains "part time farmers, part time bison hunters" who have followed the descending herds and either set up camp in a new area, or have briefly infected the "locals" with their particular style of life. As the bison eventually spread to the Texas coast, it is very likely that they were trailed by these Toyah people, who in turn either settled in scattered groups along the course of the middle and lower Nueces drainage and its tributaries, or further diffused to our own local "Coahuiltecan" people the Plains-like, occasional bison-hunting tradition. This seems to have occurred within the past 400-500 years, and continued in a small scattered way until the very end.

Recent discoveries of these pottery sites has upset the traditional thinking that pottery was not present in South Texas until introduced by the Spaniards, and as more and more of the little camps are discovered and explored, more and more of a somewhat Plains-like picture is emerging. The south Texas sites produce a scrambled inventory, with Perdiz and Scallorn-like and various other arrow point styles in association with each other, along with an occasional elongated diamond-shaped alternately beveled, resharpened "bison-hunter's" knife, with typical drills and other tools pointing due northward. Micaceous schist and soapstone are found, fashioned into various useful objects, and always the fancy, thin Leon Plain sherds.

Bison bones are recovered, not necessarily in lavish amounts, and the hunting of every living local creature is testified to by the wide variety of faunal remains which are screened from these sites. Some of these creatures no longer inhabit our now-brushy countryside, including the antelope, the prairie dog, the black bear and gray wolf and a few others.

These late, small campsites are always located on the banks of streams which flowed during "early settler" times, at locations which still seem to catch and hold pools of water after heavy rains. The sites are predictably located by looking for the largest groves of trees, such as oak, elm, mesquite, and sometimes willows. We have recently noticed that there are always small clumps of wild black persimmon trees growing within these sites, suggesting that perhaps seeds of that mid-summer edible were discarded there, or that the clumps provided an additional drawing card, along with the shade and pool of water.

At any rate, Little Flower's people have provided us with several years of excitement, and as their habits have become more predictable, more and more of their camps are being located. Their pottery style is found around the edges of south Texas' early Spanish Missions, and also at the old missions at Guerrero (San Juan Bautista), Coahuila, south of Piedras Negras. After that, they fade away, as very soon even Little Flower herself will fade again and be gone.

IN APPRECIATION

As we complete our original goal of attempting to replicate Leon Plain pottery from a state of abject unawareness through this final reporting of a few of the more memorable events of the experiment, we find that we owe considerable gratitude to a considerable number of people. Modern expert potters M.F. Chadderdon, Bebe Harp, and Al Guerra are high on our list, along with a number of statewide folks who always seemed to "understand". One of these, a neighbor blessed with Cherokee blood, often leaned on the back fence to watch us sweat over a fire. "Why?", he would ask. Our down-pat answer, "Because somebody has to do it!", always sent him away in gales of laughter, and he was too polite to point out that his people likely forgot, long ago, more than we'll ever learn.

Our interested colleagues, Drs. Tom Hester and Harry Shafer, put the pressure on us and furnished the "insights" which kept the experiment generally moving along a respectable path, and several other professional friends were interested and encouraging.

Old friend J.B. Sollberger, the Dallas master flint-flaker, unknowingly provided the initial impetus, the nudge which moved us off a dreaming "high-center" and into eventual high speed on the experiments. He asked only to be "fully informed of the project" after it bore fruit, and we hope we have lived up to Solly's expectations.

Mrs. Beadles and Mr. Haby, a pair of professional potters who practice both the tedious primitive and the more predictable modern methods, came along too late in the

game to share in the many early anxieties, but their high approval of some of our better techniques (and their horror at some of the poorer) provided us with much satisfaction. We look forward to spending time with them again.

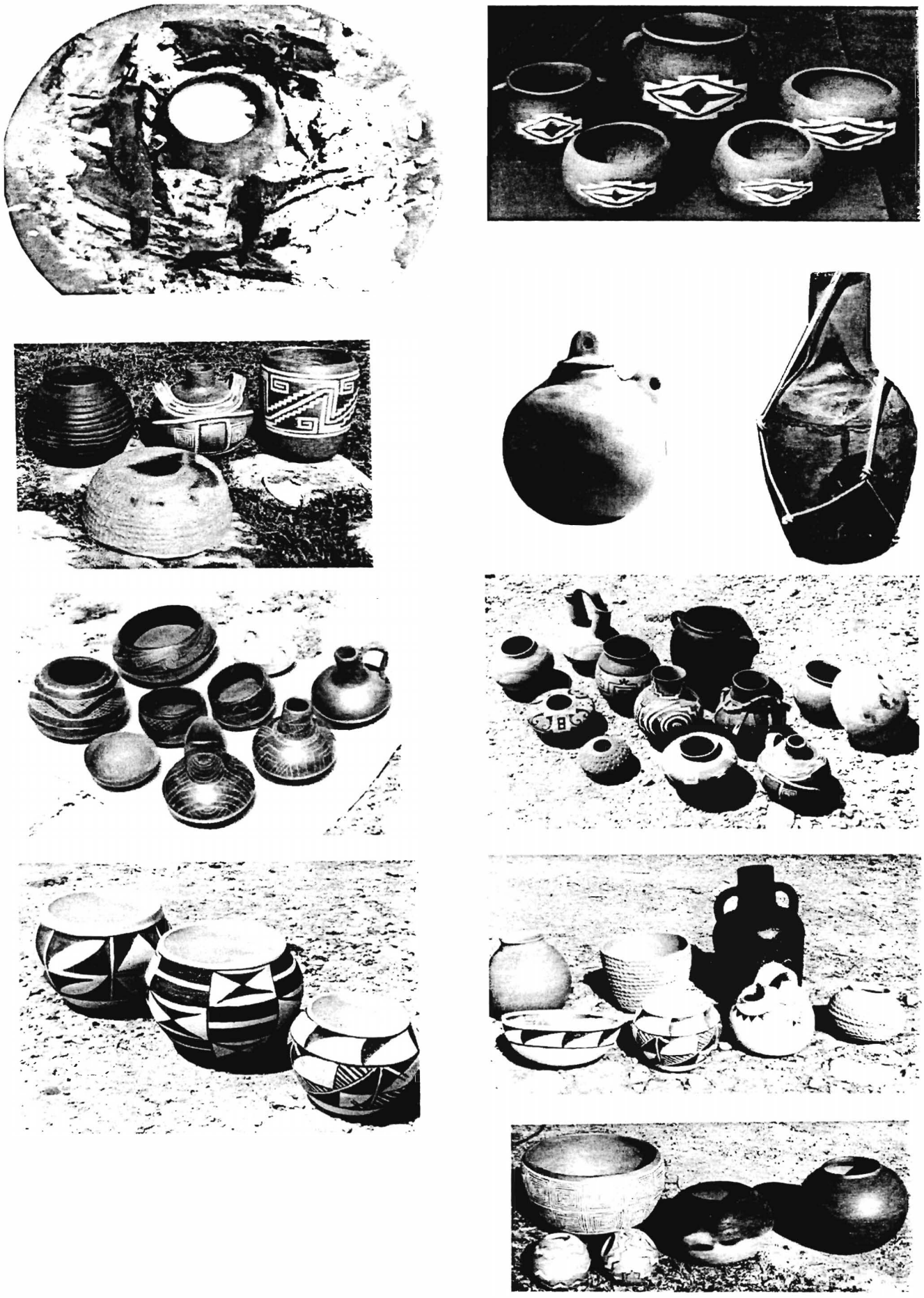


Fig. 1. Some results of the pottery experiments. Various vessels made during the two years of experiments are shown. The bean-cooking experiment is shown in the upper left corner.