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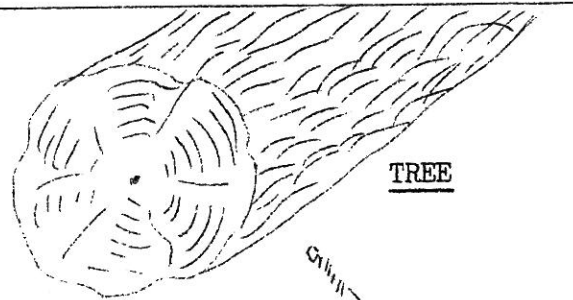
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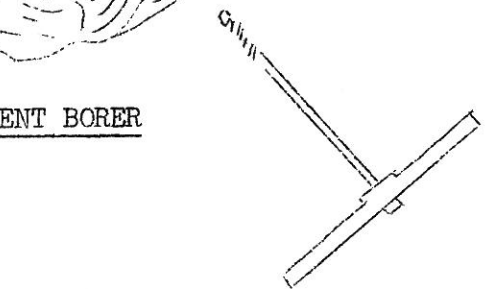
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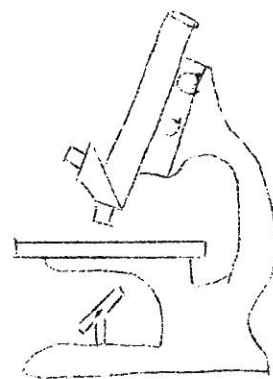
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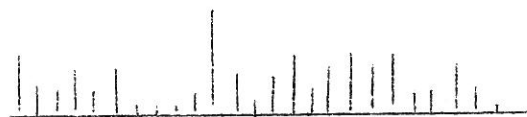
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RING PLOT

PROGRESS AT DZIBILCHALTUN

Dr. E. Wyllys Andrews is directing work at the site of what may be the oldest large city in the New World, and is certainly the largest old city known in the New World to date. The size of the city is almost staggering, and it was inhabited almost continuously for about 3500 years.

The expedition, jointly sponsored by Tulane University and the National Geographic Society, has mapped some 400 pyramids, temples, and large stone-platformed dwelling houses at the site, which extends over some 20 square miles. The site boasts the first windows discovered in Mayan architecture. The windowed room is used as an office by the expedition because of its excellent light and ventilation.

Dzibilchaltun (pronounced dzee-beel-chal-toon') will probably furnish an excellent timetable for the Mayan and Aztec civilizations, and possibly furnish a link with the Toltec, since it was occupied almost continuously from between 2000 and 1000 B. C. to the times of the Spanish conquest.

The city is built around a long, raised roadway built of stone and filled with dirt, which is about 50 feet wide, perhaps 8 feet high, and about a mile-and-a-half long. The faces and surface of the roadway are covered with smooth limestone blocks. At the end of the causeway lies a temple, which has been pretty well excavated. Shorter roadways extending from either side of the causeway, end at large buildings of some importance. One of these was undoubtedly a palace. The palace covers some 12 acres and more than a quarter of a million pottery fragments have been recovered from the site.

Typical of Mayan sites, there is a cenote, or sacrificial well, from which skindivers have recovered thousands of relics.

Not the least exciting aspect of the site is the fact that there appear to be evidences of a still earlier civilization beneath the one attributed to the Maya. Possibly Toltec or Pre-Toltec, this old civilization may extend back to 2000 B.C. or even earlier. The site will obviously furnish digging volume for many decades to come, and is expected to shed more light on Central American cultures than any other site worked to date.

TOOLS OF THE INDIAN ARTIST

In recent years there has been a rush on the part of concerned people to preserve the pictographs and petroglyphs left by the prehistoric peoples of the area. These are rapidly being destroyed by construction projects and by vandals who like to use them for targets, or by the addle-headed who attach no importance to them and like to scratch their own initials over the top.

There are several means of preserving these; photography, copy by an artist, and, in the case of petroglyphs, casts of the scratchings and carvings made with rubber or paper mache, or even plaster.

No one knows yet what most of these writings mean, but if adequate records can be made, and if archaeological investigation can aid with the work, eventually, somehow, some meaning may be attached to the works.

Some of these works were undoubtedly doodling; others may have been ceremonial attempts to appease spirits, and others may have been communications of some sort. Some represented signatures of individuals or clan totems, and recorded the passing of a person or group. Undoubtedly some were charms to bring good luck on hunts.

The tools of the Indian artists were almost as varied, although perhaps not as refined, as those of the modern artist. He used hair brushes for some of his work, and some of his pigments were essentially oil paints made by grinding up colored minerals with animal grease. Some of his work was done with crayons made by whittling off slivers of colored minerals and charcoal and using them directly. In the case of petroglyphs, the artist usually scratched his records into soft rock with a piece of flint or other hard rock, as evidenced by the worn chips often found at petroglyph sites.

Among the mineral pigments used by Indian artists were:

White:	Kaolin, limestone, ash, gypsum, and barite.
Red:	Hematite, ochre, cinnabar
Black:	Coal, pyrolusite (manganese), charcoal, and pyrite
Yellow:	Yellow ochre, limonite, and rarely, sulfur
Green:	Chlorite, malachite, chrysocolla and azurite.
Blue:	Azurite, certain shales.

To make the paints, powder was scraped from the parent rock with flint, the powder was ground still finer with two stones, and grease mixed in. In some cases, water was used to mix the paint. The paint was then applied with a stick or a brush made from hair tied to a stick, or a brush made by crushing the tips of yucca blades in order to expose the fibres.

Some of the softer minerals such as ochre, pyrolusite, and cinnabar, and occasionally hematite, could be shaped into slender rods and used as crayons.

It is important to preserve these writings wherever they appear. They can often add information about archaeological sites and migration routes. Sometimes the content of the pictures enables the student to place an approximate date upon the writings. A horse dates the pictures in historical or protohistorical times. A bow and arrow places the pictures in the Late Period.

In the case of petroglyphs, the finding of a quantity of worn flint stones in a stratum of an adjacent camp pretty well dates the carvings.

Members are urged to file site reports on all known sites containing picture writings, and to take immediate steps to photograph or copy them in faithful detail. In photographing petroglyphs, it is often useful to fill in the lines with chalk or white talcum blown through a straw onto the previously dampened surface before photographing.

NEW COMMENTS ON STONEHENGE

Professor R. J. C. Atkinson, professor of archaeology at University College, Cardiff, England, asserts that many of the stories about the stories about the famous megalithic structure are fabrications by imaginative antiquarians of years gone by. The monument, over two thousand years old by carbon date, was probably never used for human sacrifice, and it almost certainly was not built by the Druids, who did not arrive in Britain until after the monument was in existence.

He also discredits that some of the stones were precisely oriented astronomically. He points out that an impartial observer will note that the midsummer sun rises to the left of the Hele stone as seen from the center of the circle, rather than over it as claimed by many. In the times when the monument was constructed, the sun was even further to the left, and will not be over the stone until another thousand years pass.

Professor Atkinson believes that the axis of the structure very possibly did point to the place on the horizon where the first sun of the summer rises, but does not feel that this proves the builders were sun-worshippers, but only that they had an organized calendar, and used the structure to keep accurate track of the passage of a year.

Stonehenge has challenged the imagination of many visitors because of its engineering problems. Many of the stones weigh as much as 45 tons, and had to be brought a distance of 20 miles from Marlborough Downs, the nearest known source of similar material. Part of a roadway along which the blocks may have been moved is known.

That people of such primitive times could move such stones is well-known, of course, and the recent Easter Island investigations have produced detailed accounts of the procedures used in primitive times.

GEORGE HYDE WRITES AGAIN

George Hyde, author of several books on Indians, including "The Early Blackfeet and Their Neighbors," "The Pawnee Indians," and "Red Cloud's Folk," has written another book entitled "Indians of the High Plains."

The book brings together a wealth of information gathered from the records of early white explorers. The book is easily readable, and gives a broad picture of some of the migrations of recent Indian tribes.

Hyde's book does not agree very closely with some of the facts as inferred from archaeological investigations. Notably, he misinterprets the identification of some of the tribes which Coronado met on his famous march to Quivira, and tends to leap to conclusions about early tribes on the basis of very little information. However, the book, taken with a grain of salt and some other references, makes a useful source for the student of Indian history. The book is available from the University of Oklahoma Press for four dollars.

## DISPUTED TREASURE RETURNS HOME

Back in the 1880's the U. S. Consul to Yucatan, Edward M. Thompson, bought an old hacienda near Merida for about 75 dollars. Although the hacienda was in a sad state of repairs, Thompson was attracted to the place by some crumbling ruins and an old cenote or well. There seemed to be an aura of mystery about the old cenote, a suggestion of misery and sadness.

Thompson was something of an antiquarian, and was chosen for the job as consul because of his acquaintanceship with the history of the region. He was naturally familiar with some of the pre-history, too, and he wondered if the old cenote might possibly be linked with the famous Cenote of Sacrifice as used by the ancient Maya. According to some of the ancient legends, pretty virgins, and their precious belongings were sometimes thrown into a sacred well in order to appease the angry gods during times of drouth or pestilence.

Thompson wondered about the old well, and finally, he learned diving techniques and began to explore the old well. He made many dives into the murky depths before his groping in the fine silt finally yielded some results. He brought forth the skeleton of a young girl, from 12 to 16 years of age. With this evidence at hand, he promoted financial backing to buy a small hand-powered dredge to continue the exploration. The muck that was brought up soon began to yield more and more evidence of the ancient use of the well. More bones, pottery, jade ornaments, and even gold and copper artifacts. Thompson gathered all that he could produce from the well, and, using his diplomatic immunity from search of mail and shipments, dispatched the items, a few at a time, to the United States and the Peabody Museum at Harvard.

Many years later, in 1923, Thompson told his story to a reporter from the New York Times. When the story broke, there was a great furor over the rich archaeological finds that had been smuggled out of Mexico. The Mexican government sued for recovery of the items. A price of two million dollars was mentioned in the suit! While the court struggle went on, diplomatic relations between the two countries degenerated. At last, reluctantly, the Mexican Supreme Court ruled that the artifacts legally belonged to Thompson since he owned the land on which they were found, and there were no laws to prevent his removing them. However, even before the trial was settled, Mexico passed some of the most rigid antiquities laws in existence, and today it is virtually impossible to get any antiquities of value out of the country without extensive negotiations with the government. In effect, the government has claimed total proprietary rights to all antiquities within the country, and is very reluctant to sell, or otherwise relinquish possession of these materials.

In spite of the court decision, Mexican anthropologists were extremely antagonistic toward the Peabody Museum. They haughtily spurned a compromise offer of half the artifacts and relics. Finally, last year, the Peabody Museum decided to return the whole collection to Mexico. The collection consisted, among other things, of some 94 gold trinkets, and about a thousand pounds of jade carvings, obsidian knives, turquoise, carved ebony and some textiles.

When Dr. G. O. Brew arrived in Mexico City recently, his suitcases looked like those of any tourist, but the bellboy had difficulty getting them off the floor. They contained \$67,000 in good--the first installment of the return of the Thompson collection to its proper home.

#### RUSSIA'S CAVEMAN INVENTORS

If Russian news sources come up with a tall one about the advanced weapons of her cavemen, this story may be the source of it all.

In the southern part of the rugged Ural Mountains, which in that region resemble our own Big Horns, there are some caves that have yielded some evidence of prehistoric inhabitation. Russian anthropologists were not surprised or skeptical to hear of some cave paintings found recently in that area.

When the Russian investigators arrived at the scene, they found a small dark cave with several paintings on the walls. The art quality was quite good for early cavemen, and the excitement grew as the number of paintings grew to twelve. The discovery of a thirteenth painting somewhat dampened their spirits, however, for it portrayed a burly caveman waving an automatic. Three boys in a neighboring village subsequently admitted to all the paintings.

#### KING HUSSEIN AIDS SCROLL SEARCH

Jordan's King Hussein has put the vast resources of his military system into furthering the search for more fragments of Dead Sea Scrolls. These scrolls, termed the most important find in archaeology in half a century, were first discovered by a shepherd boy in a gully near the Dead Sea. Bored with herding sheep, the boy was pitching rocks into small windblown caves along the bluffs, when he was startled by a sound of crashing pottery following one of his tosses. Upon investigation, he found some old jars, which contained scraps, and even whole rolls of leather and parchment scrolls.

The boy did not attach much importance to the fragments at first, but soon found that antiquarians would pay good money for them. The Arabs of the area began a detailed search of the area, but were shrewd traders, and parlayed their finds into as much money as possible, which often involved selling the precious manuscripts a fragment at a time to dealers in antiquities. Thus a single manuscript might turn up in small pieces in the hands of a dozen or more people. Because the Bedouins did not reveal for a long time the sources of the manuscripts, the search has been long and expensive. Around \$280,000 has been spent thus far.

Now, for the first time, it appears as if scholars will have a chance to conduct a first-hand search in likely localities, with the Jordanian army supplying the field equipment, cooks, and transportation, as well as protection from bandits. With just a little money for special equipment for the recovery and preservation of manuscripts in the field, the expeditions will be able to get into the field and perhaps recover some more of these precious scrolls which have revealed so much about the times of Christ.

A year ago last summer the Geodetic Survey Department of Turkey was taking aerial photographs preparatory to mapping some mountainous areas of Turkey near the Russian border. The area had never been mapped before. The aerial photographs showed nothing directly, but when later placed in a photogrammetry machine for mapping purposes, a strangely shaped mound showed up in a lava field. The object was about 450 feet long and 160 feet wide. The regularity of its outline made the mappers think that the object must be man-made.

Because the hill on which the object was located was about fifty miles from Mount Ararat, and because the object agreed in general size with the account of Noah's Ark, it is thought that this might be the final resting place for the famed ship.

The ark is mentioned in both the Bible and the Koran. The Bible states (Gen. 8:4), "the ark came to rest upon the mountains of Ararat." The fact that the plural form is used might indicate that part of the mountain chain is meant rather than the particular peak which is Mount Ararat. Most Biblical scholars place the land of Ararat in the area where the strange form was observed. In fact, other expeditions searching for evidence of the Ark have concentrated on this general area.

The object appears to be embedded in a lava flow, and if it is indeed the Ark, it may be quite well preserved. An expedition will start for the area as soon as weather permits in the spring.

#### NEW TEXAS AMATEUR SOCIETY

The Nor-Pan Archaeological Club of Amarillo, Texas received recent notice in the Empire Magazine for its work on the Canadian River. The article indicates that they are doing professionally acceptable work, mapping and carefully excavating sites. Pictures with the article indicate a preponderance of picks and shovels over trowels, but it may be assumed that perhaps this was necessitated by hard digging conditions rather than lack of proper technique. We sincerely hope that the Nor-Pan group is going to be a group that can make the name of amateur a proud one rather than a synonym for "pot-hunter."

In 1958, the group dug a site on the Canadian River that was soon to be flooded by a proposed dam. The Canadian River Complex is not too well known at present, but it is believed to have existed along the river around 1250 A.D. to about 1450 A.D. Earlier diggings indicated that the people constructed row houses or apartment-like houses with connected rooms, but the Nor-Pan project discovered several one-room structures. Through recovery of some distinctive pottery, the group was able to relate the site to the Upper Republican Complex, a link which had been suspected by archaeologists, but was heretofore unproven.

#### DENDROCHRONOLOGY

Dendrochronology, or tree-ring dating, is one of the most accurate methods of dating known to archaeology. The method, like so many others in modern archaeology, derived from a completely unrelated line of investigation.

Dendrochronology started, of all places, in an astronomical observatory. Dr. A.E. Douglass was making observations and collecting data relative to the occurrence of sunspots. He had noted that the sunspots seemed to be more pronounced at some times than others, and eventually, when enough data were available, he was able to see that there was an apparent eleven year periodicity to the sunspot cycles.

Dr. Douglass needed more data to complete his studies, and astronomical studies were not available for any great length of time in the past. He had noted however, that sunspot activities were correlated with certain atmospheric disturbances on the earth. For example, displays of the aurora were more common and more brilliant during sunspot maxima, and the then-new science of radio and telegraphy had been noticing that auroral displays and garbled communications seemed to go hand in hand. Similarly, Dr. Douglass noted that there seemed to be a record of slightly increased rainfall in arid regions during high sunspot activity. Dr. Douglass wondered if the annual growth rings of trees might not record the rainfall over long periods of time.

Dr. Douglass went to Arizona in order to pursue his studies of sunspot activities as recorded in the growth patterns of trees. He went to the arid regions of the semi-desert country in order to find trees that were barely surviving on the moisture they received. He reasoned that such trees should be very sensitive to any slight change in the amount of annual rainfall.

As expected, the trees were sensitive to climatic conditions, and Dr. Douglass worked to extend his evidence as far back as possible to see if there had been any change in the periodicity of sunspot activity in recent times. He was able to find living trees whose record extended back for around five hundred years, but he wanted to extend the record if possible. He began to get dead trees that had been preserved from rot and to check their rings. He found that they, too, showed significant variations in growth pattern recorded by the annual growth rings.

In order to connect the climatic patterns of the past with those of the present, Dr. Douglass began to try to correlate the growth patterns of various trees, and found that trees growing under similar climatic conditions over a wide area had readily correlatable patterns of growth recorded in their rings. He was able to take some of the charts made from dead specimens and correlate them with living specimens in those years during which their growth overlapped. That is, the later rings on the dead specimens showed the same growth patterns as the earlier rings of living specimens. The earlier rings of the dead specimens would thus extend the record produced by the living trees, and allow Dr. Douglass to study the climatic pattern farther into the past.

The search was started for older and older tree specimens that would serve to extend the record farther back in time. In 1914, investigators at Pueblo Bonito supplied segments of six ceiling beams recovered from the ruins to Dr. Douglass for examination. He charted them, and, in 1919 he



received some beams from Aztec ruin. He charted these, and was able to deduce that the trees from Pueblo Bonito had been cut forty to fifty years before those from Aztec. The first dendrochronological date thus established was a relative date.

During the succeeding years more and more beams from pueblo ruins were collected, charted, and matched. At the same time, working backward from living specimens, a long chart was being built. By the end of 1928 two charts, or chronologies, were available for the pueblo area. One of these, which extended back from the present, reached to 1300 A.D. This chart was well defined with a number of specimens supporting each segment of the chart. There was one additional piece which seemed to go back to about 1260 A.D. Single specimens, however, were not considered conclusive. The second chart, or chronology, was called a floating chronology because its end dates were not known. The second chart was made from a set of more than thirty beams, and had furnished relative dates for several ruins.

If some specimens could be obtained which would bridge the gap and tie together the two chronologies, it would be possible to get nearly exact dates for many of the ruins of the southwest. It was at Showlow in 1929 that material was finally found which bridged the gap. Actually it developed that there had been no gap at all, but a very short overlap. The overlap fell in a very difficult period to date, because of the great drought that existed in the area at the time, and it had been necessary to obtain a number of specimens covering the period before a definite connection could be established for the two chronologies. That great drought extended from 1276 to 1299, and was responsible for the abandonment of some of the large pueblo settlements, and the migration of their people to new areas.

At the present time a chronology exists for the pueblo area which reaches back to 11 A.D. The earliest date established by this means is 203 A.D. for a cave in southwestern Colorado which had been occupied by Basket-makers, who preceded the Pueblo culture.

In California a chronology made from the long-lived sequoias reaches back to 1305 B.C. There are many chronologies for different parts of the country. In some cases, cross-checking can be obtained between large areas, but usually it is not safe to use a chronology for any area other than that being investigated. The wetter the climate, in general, the smaller the area that can be covered by a single chronology.

Only certain woods are suitable for dating. Juniper is often unusable because of erratic growth habits. Mesquite does not seem to date, and cottonwoods and other trees which hug the banks of streams usually do not show sufficient variation from year to year to have any usable patterns in their growth rings.

Large charcoal fragments are almost as good as wood for dating purposes if they are derived from the right kind of wood.

In preparing tree-ring dating charts, a good deal of painstaking labor and study is often necessary. First the specimen must be obtained

and prepared. Then its growth rings must be examined microscopically and measured. These must then be plotted on a chart, and later averaged with other specimens wherever available. The more specimens used, the better the chart will be.

Samples are obtained from living trees and from large wood specimens by means of an increment borer. This instrument screws into the tree and removes a small cylinder of wood about twice the diameter of a matchstick. This specimen is then glued into a groove in a special piece of moulding in order to protect and support it.

To prepare the specimen for reading, a very sharp blade is used to slice a flat surface on top of the mounted specimen. If the sample is charcoal or rotten wood, several treatments with preservative, hardener, or other materials may be necessary in preparation for this step.

Once a smooth surface is obtained, the specimen can be viewed under some kind of measuring microscope. The methods used vary with the amount of money available for equipment, and the amount of material to be studied. At best, the process of individually measuring the width of each growth ring and plotting it on a chart becomes tedious. Some investigators, working in areas of constant aridity, plot only the unusually small rings in order to save time, but in the mountains of Wyoming, every ring must be plotted and studied carefully in order to obtain cross-checking.

The plot may be made in several ways, but the simplest is simply to plot each ringwidth as a vertical line on a scale, as shown in Figure 1, below.

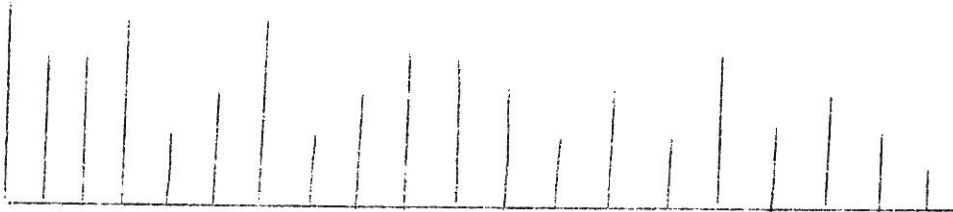


Figure 1

In the case of a master chart for an area, a number of samples are averaged to produce the ring-widths used for each line. In a master chart, the lines are usually plotted with the ring-widths extending upward from the base line as shown in Figure 1. In the case of a sample to be dated, the lines are usually extended downward, to facilitate side-by-side comparison of the two charts, as shown in Figure 2. The directions could as well be reversed, of course, according to personal preference.

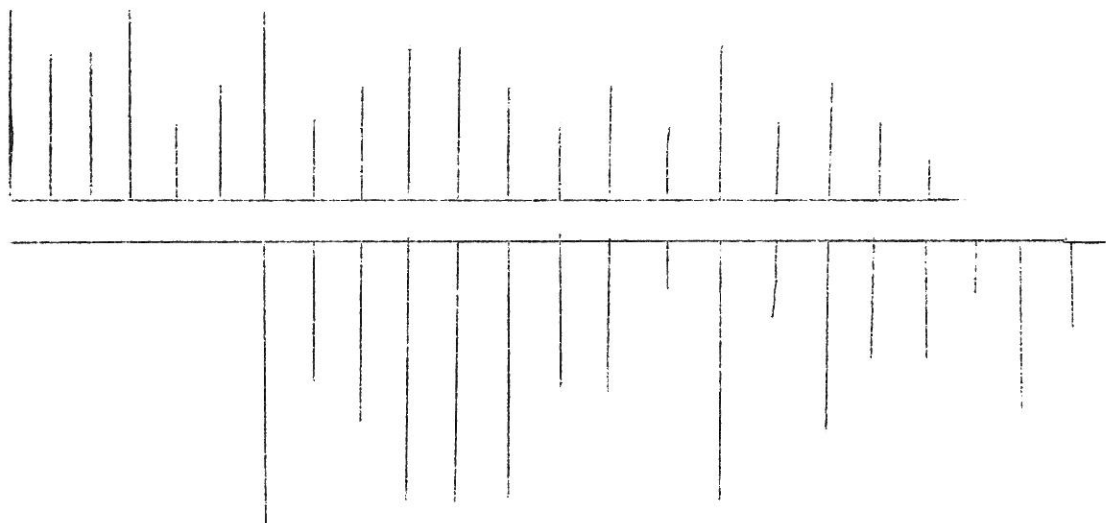


Figure 2

In making comparisons, it is not the actual size of the rings that is important. Instead, the investigator looks for patterns of changing ring size. Note in Figure 2 that the two specimens have much different ring sizes, but that the pattern of large and small rings compares very well in the region of overlap. Don Grey is experimenting with difference plots in which the size of the ring is not plotted at all, but rather the difference between the width of the ring and that of its predecessor is plotted. Thus only the changes are plotted, and compared. If the second ring is larger than the first the difference is plotted above the reference line, and if smaller, the difference is plotted below the line. Such a chart for the specimen of Figure 1 would look like Figure 3.

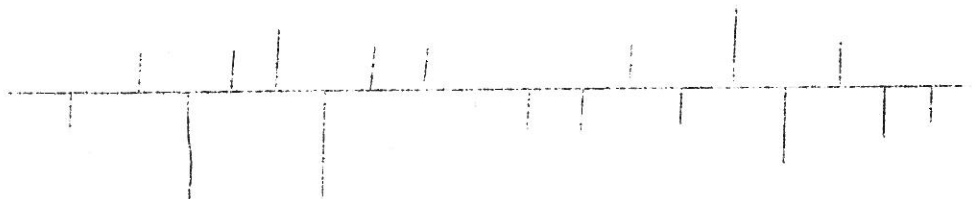


Figure 3

The comparison of specimens is often complicated by missing rings, or sometimes by doubled rings. Some years are so bad for tree growth that the tree does not grow, and a ring is missing. At other times, two favorable periods for growth may occur during the same season, resulting in two apparent growth rings. These can usually be distinguished by careful examination, but great care must be used to locate such cases. Other problems are caused by fragmentary rings, scars, or other natural occurrences.

Generally speaking, a growth ring consists of two parts, First is a light colored band of large cells laid down around the tree when growing conditions are good, usually in the spring when the moisture on the ground is at its peak, and the sun is beginning to warm. Later in the summer,

the growth conditions become poorer as moisture disappears under the hot sun. The growth during this time consists of small cells, crowded together, and usually dark colored. In the fall, the tree becomes dormant, and growth ceases. This time is marked by an abrupt cessation of growth of the summerwood, causing a sharp line of demarcation between the summerwood and the springwood of the following year. The line between the springwood and summerwood for the same year is usually rather gradual and not too well defined.

Double rings sometimes occur when an unseasonal wet period occurs after the summerwood growth has started. When this happens, the tree sometimes returns to a spring-like growth of light colored, large cells. Following these will be found another band of summerwood when conditions become poor again. Usually a doubled ring can be detected because the first band of summerwood shades gradually into the second band of springwood rather than having an abrupt edge as occurs between annual rings.

Occasionally, two annual rings will masquerade as a double ring if the winter is so mild that the tree does not become completely dormant. There are other difficulties, too, but with sufficient study, the method is capable of good results, and when a date is obtained, it is more accurate than any other laboratory methods of dating sites.

#### OVER THE CAMPFIRE

Several months ago, when this publication was still called the Smoke Signal, we asked people to submit ideas for cover designs. The designs are still on file, and it is hoped that some of them can be used on forthcoming issues of memoirs produced by the society. They were too good to be wasted.

Are you getting the rust off your trowels? Spring is just around the snowbank, and there's a lot of good work to be done this summer. The Casper chapter has a good site lined up for an early spring dig, and there are numbers of good sites to be worked on all summer long. Plan to spend some time at the sites this summer and get in on the fun. With a proven Meserve site to work on, there should be all kinds of room for exciting discoveries.

The carbon dating lab took a big step forward recently with the promotion of some lead shielding for the counter tube assembly. While progress is not nearly as fast as would be desired, heavy teaching schedules at the college for Don Grey have prevented his devoting much time to the work.

We are hoping to hear from some samples submitted several months ago for thermoluminescent dating. The laboratory was to go back into work sometime after the first of the year. We don't know how far down the list our samples were, but it would be nice if the dates could be gotten back for inclusion in our memoir.

The state officers of the society have been busy making necessary changes in routine to take care of the expansion of the organization. This journal will keep the readers and members posted on any actions taken that might affect the society as a whole.

Keep those site reports coming. See you at the dig.

EMBERS OUT