Back

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LAB REPORT #79

CROP FORMATION:
LOGAN, UTAH - August, 1996

Formed early in August in barley, this was the first crop formation found in Utah in recent times. Overall length approximately 190 ft., large circle 58 ft.-diameter, smaller circle 30-ft. diameter. Crop lay was more radial than spiral. Small triangular holes were found in the centers of both circles and at end of long path heading South.
Light phenomena were observed & photographed (Addendum).
Top photo: Mitch Mascaro, *The Herald Journal*; bottom photo: Con Olsen.

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LAB REPORT #79
March 16, 1997
Pinelandia Biophysical Lab

Lab Code: KS-03-131

Event Location: Seth Alder Farm, Logan, Utah

Date Occurred: First or second week of August, 1996

Date Discovered: August 15, 1996

Date Sampled: August 25, 1996

Materials Sampled: Barley stems and heads (*Hordeum vulgare*), soils

Sampled By: Todd and Lisa Weakland, Ryan Layton

Formation Characteristics: Two circles (30.4' and 58' diam.) w/connecting path, additional pathway to the south, & associated triangular pathways around large circle (see Fig. 1). Overall length approximately 190 '. Crop lay was more radial than spiral, and was chaotic in appearance. Three small triangular holes were found: in the center of each circle and at the end of the southern pathway.

Close-up showing chaotic appearance of crop lay in 30.4'-diam. circle.
Photo taken a few days after discovery, by Con Olsen.

Ground shot in larger, 58'-diameter circle. Ragged, irregular circle edges indicate turbulence. Photo: Con Olsen.

Relevant Findings:

1. **Node expansion levels were found in the range of 15-65%,** relative to the controls;

2. **Expulsion cavity incidence found to be as high as 40%;** none found in the controls;

3. **Seed weights and seedling growth were reduced** in plants along north radius of large circle;

4. **Altered soil structure indicated by X-ray crystallography;**

5. **Soil alteration simulated by exposing control soil to microwaves.**

Discussion of Results:

When examining the summarized node-length data it should be kept in mind that any set of samples that has a mean node-length change greater than 15% (relative to the "normal" control plants) is statistically significant. When data is statistically significant one can be confident that there is a greater than 95% probability that the data are anomalous, relative to the control samples. [This level of significance is accepted in scientific research and in all scientific journals as being meaningful.]

Figure 2 shows node-length (NI) data from plants sampled along the north and south radii in the large, 58'-diameter circle. The fact that the curves produced by the data are similar in shape, but not the same, indicates that the energy profiles which caused the node-length changes were similar along the radii, but that the magnitudes of energy delivery were quite different. This was also apparent when we examined the plant nodes for the presence of expulsion cavities.

From past studies we know that a very rapid rate of heating will cause the plant stem nodes to literally blow open to form what we have termed "expulsion cavities" (see Fig. 4), an effect which is apparently unique in crop formation plants (they are rarely found in control plants). Expulsion cavities are more likely to be found in mature plants which have less elasticity in their fibrous epidermis, than in younger, less-developed plants.

When plant nodes are subjected to the heating element of the crop formation energy system the moisture inside the plant node turns to steam and internal pressure builds up; if this occurs at a rapid rate the node tissues rupture and the pressure is relieved through the formation of an expulsion cavity. When expulsion cavities are present (usually in the penultimate or second node beneath the seed-head), node elongation (usually in the apical, or first node beneath the seed-head) is likely to be less. This occurs because, in plants in which the pressure builds up to just below the critical value for rupturing the expanded node tissue, the expansion continues and no expulsion cavities form.

If we examine all the north radius node-length data from the large circle we find (see Table 1) that the overall node expansion is high, whereas the expulsion cavity level (the "safety-valve" effect) is relatively low. On the other hand, the south radius data show the opposite situation: that is, a low node expansion and a high number of expulsion cavities. This implies that the rate of energy transfer was more rapid along the south radius than along the north. In other words, the rotation rate of the energy vortex was such that the energy was not distributed uniformly throughout the large circle.

We also found similar patterns of node-length changes and expulsion cavity distribution (Fig. 3) in the plants taken from within the small circle. In the Table 2 data we again see a tendency for the high/low, low/high relationship between node elongation and expulsion cavity distributions along the radii. Here, however, the north radius appears to have been subjected to the higher rate of energy input, again resulting in an increased number of expulsion cavities. This result simply means that the organized plasmas operating within these two circle regions were functioning in an independent manner.

In the past we have received anecdotal reports of visual changes in the soils within crop circles; however, the Logan study if the first instance in which we have been able to work directly with a professional geologist (Ms. Diane Conrad, President, Meridian Environmental Co., Salt Lake City, Utah). For details of Ms. Conrad's investigation, see item #3 in "Details of Findings," below.

The plant node data indicate a localized, transient heating of the plants. The level of this external energy input was sufficient to produce significant node elongation, expulsion cavities, alterations in seed weights and seedling growth. These results are consistent with the concept of organized plasma vortices operating within dissipative, chaotic structures as the causative agency of crop formations.

Since the energy influenced both the somatic and germinal tissues of the plants, this formation must have occurred during a critical interval in the development cycle of the crop.

Details of Findings:

When received at the laboratory the individual plant stems were so broken up that it was necessary to combine the apical and penultimate node measurements within each of the 37 sample sets. When we could not tell where on the plant stem a node came from it was discarded and not included in the analyses.

From the field-sampling diagram (Fig. 1) it can be seen that there are three separate sections (or sampled areas) of importance within this formation, namely the larger 58 ft.-diameter circle, the smaller 30.4 ft.-diameter circle, and the approximately 80 ft.-long pathways extending north and south of the larger circle. Accordingly, each will be discussed and the results compared. *(Click on diagram below to enlarge.)*

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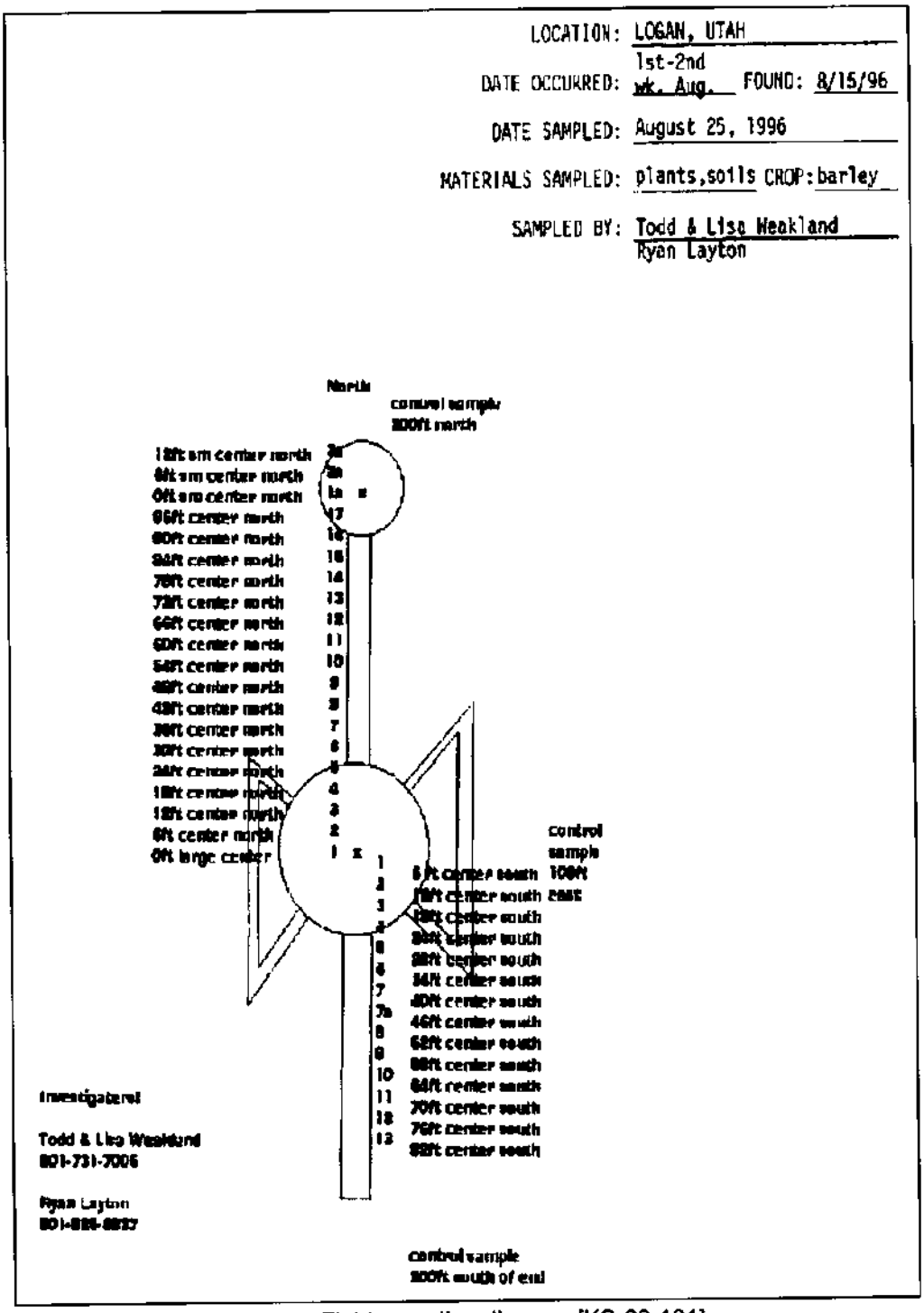

Fig. 1: Field-sampling diagram [KS-03-131]

(1) Plant Stem Node Analyses

The node lengths were measured using a metal scale graduated in 0.5 mm divisions and a 6X loupe. This provided a 0.1 mm precision of measurement, which is adequate for these purposes. Most node changes in crop formation plants are expansive in nature, and in the range of 0.5 up to 1-3 mm of increased length,

relative to the controls. From each sample set between 10-30 notes were available for analyses. In addition to node lengths, each sample set was carefully examined for the presence of expulsion cavities. Fig. 2 shows the node-length changes as a percent-change relative to the mean of the controls.

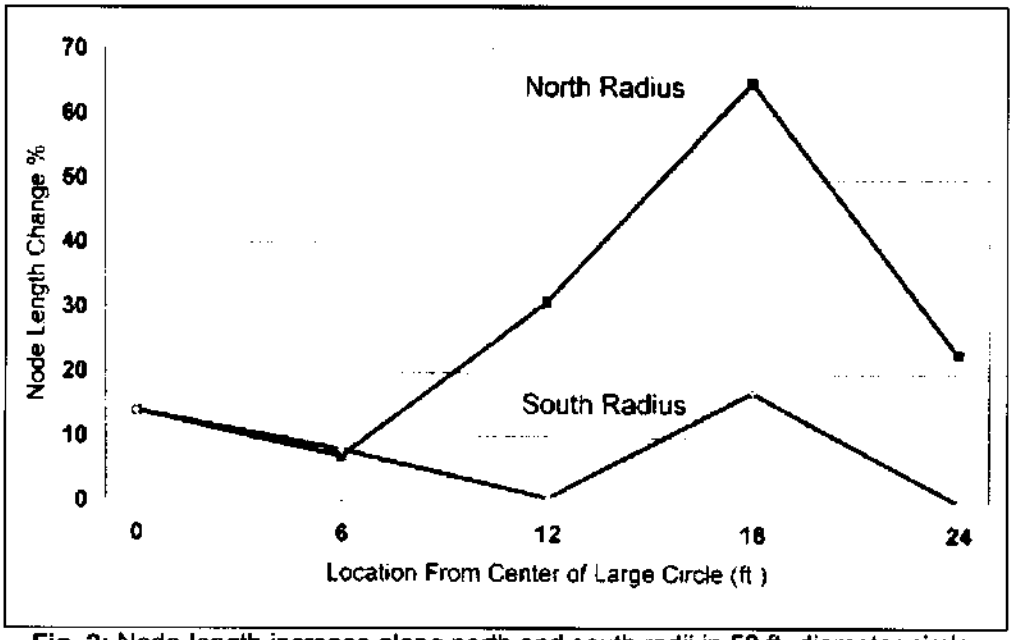

Fig. 2: Node-length increase along north and south radii in 58 ft.-diameter circle. *The differences in node-length change here are thought to be due not to the total energy exposure but, rather, to the rate or duration of the energy delivery.*

It should be noted that the data points lie either on the base (or at zero level) or above--that is, they are positive. This means that the energy effect expanded the nodes. In this and the following figures any node-length change greater than 15% is statistically significant. Along the south radius of the large circle only the nodes taken at 18 ft. south of the center are expanded at a level of significance, whereas node-sampling at 12, 18 and 24 ft. north of the center are found to be elongated significantly.

The plants along the north radii of the large circle received a much higher input of energy than did the plants along the south radii. Further investigation reveals, however, that the situation was more complex. If we look closely at the frequency of expulsion cavities in relation to the degree of node elongation we obtain a clearer understanding of the energy distribution. Table 1 summarizes the degree of node expansion and expulsion cavities along the north and south radii in the 58 ft. diameter circle (mean node-length change is the average of the five sampling locations shown in Fig. 2); expulsion cavities were averaged within these same sample groups.

Table 1:

Comparisons of mean node-length changes and expulsion cavities along north & south radii in large, 58' diameter circle.

Sample Location	Node Length Changes	Expulsion Cavities
North Radius	+28 %	4 %
South Radius	+10 %	23 %

Here we observe a reciprocal type of relationship between the two anatomical transformations in the plant stem nodes. That is, when the node elongation is high (as in the north radius) the expulsion cavity level is low--and, conversely, in the south radius we find low node expansion with a high incidence of expulsion cavities.

We have observed exactly this same situation in previous crop formations. Here, the heat input rate along the north radius was insufficient to form expulsion cavities in the majority of the plants; consequently, the pressure was not released and a greater degree of node elongation occurred. The differences in node-length increase and expulsion cavity incidence along the north and south radii are not due to the total amount of energy delivered but, rather, to the rate of energy delivery. Thus we are apparently observing the effects of an energy vortex which rotates at a different rate in its path of fixed-point rotation. The node-length changes and expulsion cavity incidence at sampling points in the smaller, 30 ft.-diameter, circle are shown in Fig. 3.

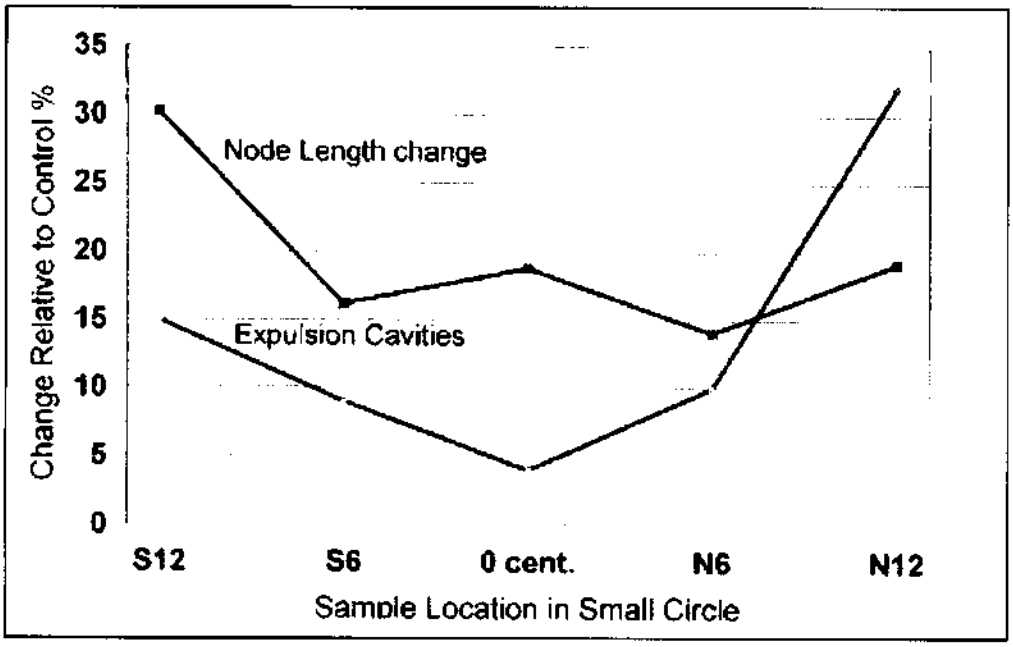

Fig. 3: Node-length increase and expulsion cavity incidence in plants from smaller, 30.4 ft.-diameter circle along south radius [S12, S6], at center [0], and along north radius [N6, N12].

Table 2:

Comparisons of mean node-length changes and expulsion cavities along north & south radii in small, 30.4' diameter circle.

Sample Location	Node Length Changes	Expulsion Cavities
North Radius	+17 %	30 %
South Radius	+23 %	12 %

Here we again observe the low/high, high/low relationship between the node- length changes and the expulsion cavity incidence. Here, however, the north radius apparently received the higher rate of energy input.

Plant samples taken down the long pathways of the formation also disclosed significant node length increases and expulsion cavities, but the data showed no

consistent patterns, such as were observed in the two circles.

Fig. 4: Explusion cavities (top photo) in barley plant stems in larger 58 ft.-diameter circle, compared to controls (bottom photo) taken 108 ft. east of formation.

(2) Seed Analyses

Both seed weights and paper-roll germinations were obtained from all of the sample sets. Seedling data were recorded at 5 and 8-days germination. Analyses of these data disclosed significant differences between the control and formation samples. Sufficient sample sets were available from the large circle to provide a statistical comparison (Table 3) of the seed development in the north and south radii.

Table 3:

Seed weights & precision germination results in the 58'-diameter circle, compared with controls.

Sample Location	Weight Per 20 Seeds ave.	s.d.	8-Day Plant Height ave.	s.d.	No. Plants
Controls	0.987	0.066	15.21	0.56	56
North Radius	*0.882	0.092	*13.95	0.92	246
South Radius	0.902	0.077	15.17	0.44	202
*P < 0.05					

Here we observe that the seeds from the plants along the north radius of the large circle had significantly reduced seed-weights and seedling growth. Cell damage would be expected to be greatest where the heating was most prolonged: referring back to Table 1, we see that the plants along the north radius also displayed the highest degree of node expansion. Both of these findings indicate that heating was more prolonged along the north radius than it was along the south radius, where the energy apparently popped in and out much more rapidly.

It appears, also, that this formation occurred at a time in the plant development cycle when the seeds were very sensitive to the external plasma energies.

(3) X-ray Crystallography of Soil

[*This section of Lab Report #79 has been re-written for the BLT web-site, in consultation with Diane Conrad on 5/3/03.*]

"Ms. Diane Conrad, a geologist who lived near the Logan, Utah crop formation in 1996, was curious as to whether there might be evidence in the soils which could provide additional proof of the presence of external energy at the crop circle site. Having written her Master's Thesis on heat effects in clay minerals (utilizing X-ray diffraction analyses [XRD]), and aware that exposure to external energies can alter the crystalline structure of certain clay minerals and that such changes can be determined through XRD examination, she decided to carry out a preliminary investigation of the Logan, Utah cropcircle soils.

A soil sample was taken from within the Logan formation, about 5' west of the center of the larger circle, and a control approximately 100' west of the edge of the larger circle. After separating out the clay minerals, the XRD analyses was carried out. A graph is produced by the XRD equipment, with multiple peaks, each of which represent specific clay minerals in the sample being tested. In expandable clays, the width of this peak is measured at half-height producing a value known as the Kubler Index (KI), which is an indicator of degree of crystalline structure. The lower the KI, the greater the degree of crystallinity (greater ordering of the crystal lattice) in that specific clay mineral.

The soil sample from within the crop circle showed a pronounced decrease in the Kubler Index (KI) of the illite peak, as compared to the control (S=0.11; C=0.25), indicating increased crystallinity in the circle sample (or exposure of this sample to external heat or energy).

The control sample was divided into aliquots and, in at attempt to replicate the observed decrease in KI in the Logan cropcircle sample, one aliquot was heated in a conventional oven for ten minutes at 93¼C and a second aliquot for ten minutes at 287¼C. A third aliquot was microwaved for two minutes on "high" to determine the effects of energy of different wavelengths on the crystal structure of the illite component. In the control aliquots heated to 287¼C and microwaved, the KI was observed to decrease--with the microwaved aliquot producing a KI most similar

(.07) to that of the original circle sample (.11).

These results, although very preliminary, indicate an increase in the ordering of the crystalline structure of the illite fraction of the clays in the Logan cropcircle soil--a change indicative of exposure to external energy. Additionally, the change observed in the circle sample was closely approximated by exposing control soil to microwave radiation."

Therefore, in this preliminary XRD examination of crop circle soils, we have an additional indication of the presence of external energies and transient heating during the crop circle formation process.

W.C. Levengood Pinelandia Biophysical Lab	Nancy Talbott Cambridge, MA	John A. Burke Am-Tech Lab

Our thanks to Diane Conrad, Consulting Geologist, Meridian Environmental Co., Salt Lake City, Utah.

Addendum:

Five years after the Logan formation had occurred (and after this Lab Report had been written) I heard about a young man from Salt Lake City who had visited the Logan circles a week or two after they were discovered and had a very unusual experience. Dave Rosenfeld had never seen a crop circle before and, out of curiosity, he drove to the Logan site to see a crop circle for himself. Arriving at about 8 pm (just as it was getting dark) he and his girlfriend went into the field and were amazed to observe multiple "small white lights moving about the field" both over and near the formation.

These balls of light (BOLs) were perfectly spherical, some appearing to be 2-3 inches in diameter and others more the "size of a baseball." They noticed that "the closer they were, the brighter they were" and that "the ones farther away were not only bigger, but more transparent, or not as bright." They made no sound at all. Dave reported that there were "about 20 of them at a time...like a whole herd of luminous bubbles dancing around the field."

When Dave or his girlfriend tried to get closer to any of the lights they would disappear, or move quickly away, "always keeping about 3 ft. away from either one of us." The BOLs, at times, moved very fast, as if "interacting with each other" and "as if they were alive," never moving more than 15 ft. above the ground. The couple tried to catch one of the BOLs, on one occasion attempting to "trap it between us," but the BOLs just disappeared or would blink out when either Dave or his girlfriend got "too close."

In another instance Dave tried to "fool" the light balls by turning his back and pretending that he intended to leave the circle. After walking a few feet he suddenly spun around, to see a very bright light ball right behind his back. While chasing the light balls Dave had the imprssion that the BOLS were "teasing us...some would fly or float around us as if they were playing with us, or checking us out; but if we got too close they would be gone instantly, like a bubble popping."

After witnessing the light balls for awhile Dave went back to his truck to get

his camera and, upon his return to the field, attempted to capture the BOLs in a number of photos with his Canon automatic camera (Kodak 400 ASA film).

Light ball in Logan, Utah crop circle, one of dozens of clearly visible "luminous bubbles" observed "dancing around the field" for at least an hour. Photo: Dave Rosenfeld

Only one photo came out, which shows a light ball about 2 yards away from the camera lens and about 3 feet in the air. The BOL itself was, according to Dave, perfectly spherical. The blurred streak behind the BOL on the photo was not visible to the eye, although Dave noted that the light balls which were close to him did seem to react to the flash going off, and would "jerk" or make a quick movement away.

After an hour or more in the formation, the light balls "slowly left us, blinking out a few at a time, or moving off in the distance and fading out." Both Dave and his girlfriend had had a feeling of playfulness throughout the encounter, as well as the distinct impression of communication of some sort having taken place. For Dave's full account click here.

This is the first account we know of in which witnesses both observed visually and interacted over an extended period of time with light balls in a crop formation--and obtained photographic evidence of the experience. This report also supports other accounts of BOLs and/or strange energy effects experienced in or near crop circles, sometimes long after the crop circle formed.

Nancy Talbott
5/03

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