MARCH 1, 1993

RESEARCH REPORT: PINELANDIA BIOPHYSICAL LAB.

TENTATIVE - CROP CIRCLE VERIFICATION METHOD

BACKGROUND OF METHOD

One very significant finding from the crop circle research conducted over the last two years, relates to the observed changes in the size distributions of very minute, natural occurring "pit structures" located in the cell walls of plants. Recent studies have shown that within plants from crop circle formations these pits may be in the expanded form in plants taken at one location in the formation and in the contracted form (relative to normal, upright controls) in plant material from another location in the same crop formation. The statistical spread in the crop circle data extends significantly outside the spread in the normal controls (such a wide spread is not found, however, in plants that have been intentionally trampled that is, from "artificial formations"). The point to be made here is, that this wide range within pit size statistics makes them of little value as a reliable verification tool.

These pit size alterations have been documented in stem node tissue (parenchyma type) and in bract tissue (epidermal type) within five different crop species representing formations occurring in England, Canada, the U.S.A. and Australia. From the ubiquitous nature of the pit changes it seemed logical to consider the possibility that these crop circle energies are also producing perturbations within the complex microfibril construction of the cell wall itself. Due to the visco-elastic properties of the cell wall matrix, there is a high probability that if such structural alterations do occur, they would be irreversible. Obviously one advantage of being able to detect a permanent change, would be realized in a reliable method for verification of those crop formations produced by the complex interactions of externally applied energies. Another more personal reason for undertaking this new investigation is the possible elimination of the very tedious, time consuming, eye straining, microscope measurements of the cell wall pits. Also there seems to be a general disregard and lack of appreciation relating to the significance of the pit size changes, even though their importance has been discussed a number of times in the lab. reports.

In early Dec., 1992, a program was initiated in this laboratory to investigate the structural characteristics in plant cell walls as related to ion-membrane transport mechanisms. As a starting point, the method employed was based on work published from this laboratory (Reference: W.C. Levengood, Ion Transport in the Testa of Germinating Seeds. J. Exp. Bot. 36, pp. 1053-1063, 1985). Several weeks were spent applying this particular concept to crop circle plants and their controls - the results were negative. It may almost be considered an axiom that it never seems a good idea to quit on the first failure.

Over the next several weeks the methodology outlined in the above reference was totally modified and the sensitivity to changes in the cell wall structure, greatly increased. In the exploratory phase of this modified system a very interesting and what appears to be a significant response was noted in the ion transport characteristics of the plant cell wall tissues. An amazingly consistent pattern of spontaneous oscillations was observed to take place in the ion conductivity outputs. At that time it was vary tempting to ignore the crop circle problem and delve into the fundamental aspects of this new ion transport activity; however, work was continued on the formation material. Before proceeding further into the discussion of this work there are several comments to be made concerning the status of the project.

1) This work is preliminary in nature. This means there is considerable research that has to be done to assess and clearly establish the limits and use as a verification tool.

2) This new effect has implications beyond the crop circle work, therefore, the details will not be presented before an introduction into the scientific literature (the editors of scientific journals are quite adamant about refusal of material with prior release into the public domain).

3) There will be no "blind tests" conducted by this laboratory until the exploratory phase of the research is completed - this will probably take at least another crop season.

4) This is not a method applicable to "field testing" - it is a laboratory tool. As has been consistently stated by this laboratory, the energy combinations producing crop circles are complex, and precise, subtle methods will be required to sort them out.

GENERAL STATEMENTS CONCERNING METHOD

In Fig.1 (attached) is a section from a recorder trace showing typical oscillation responses in wheat bract tissue from two different test runs (the traces were overlapped to conserve on chart paper). The chart paper speed was 10 cm/hr. and in the upper curve the period of oscillation is very close to 18 min. (3-horizontal divisions), in the lower set the period is somewhat longer (21 - 22 min.); however, a secondary oscillation has developed as clearly shown in the last cycle on the right. In the vast majority of the sample sets (both crop circles and controls) the period hangs very close to an 18 min. interval.

As with any new direction in research, there are many aspects to be explored in the early phase of study. One of the first of these was the determination that the cyclic patterns form in both seeds and the contacting bract tissue (same tissue as used in the pit size studies). Without delving into the details, a comparative study (again about a weeks work) established that the bract tissue gives the most consistent results and fortunately is the most convenient to use. All of the following discussions will be based on bract tissue.

*- The bract is carefully removed from the seed head and placed in the "system".

*- A chart recorder traces the time course of the ion transport through the tissues and produces a record of the very uniform, spontaneously generated oscillations (Fig.1).

*- Note that the data are obtained without any sample "measurements" being conducted by the experimenter (information is collected automatically).

*- To produce a typical set of data containing at least five complete oscillation cycles (a reasonable number chosen for analyses) takes from 2-3 hrs.

*- By using a dual channel recorder, two samples can be examined over the same test interval.

*- From the chart recorder traces (Fig.1), detailed statistical analyses of the oscillation patterns have demonstrated that the important factor (in relation to the crop circle verification procedure) is what has been termed the "amplitude coefficient" or alpha (α) for brevity purposes, and is given by;

$$\alpha = (A_m/i_m)$$

where i_m is the peak ion current for that cycle and A_m the amplitude of the current (determined by the base line level of the minima).

*- Each sample run provides five alpha values per trace. The current procedure involves six replicate tests on individual bracts (each selected from a different plant if available). Controls and crop circle samples are ran in alternate tests. The 30 data points (alphas) are entered into a computer program ("Statview") which provides a convenient means of statistically analyzing many aspects of the data population. As of this date the most significant information has been obtained from a frequency distribution analysis. In addition the usual statistics such as mean, s.d., variance, etc., are also examined.

PRELIMINARY RESULTS FROM CROP CIRCLE STUDIES

Recently, a most exciting find was the appearance of the same general type of oscillation pattern in oat bracts. This suggests the operation of a very fundamental mechanism independent of plant species (wheat, *Triticum aestivum*, oats, *Avena sativa*). Moreover, the oscillation period in the oat tissue was very close to 18 min., as it was in the case of wheat.

One of the most interesting and valuable aspects of the frequency distribution analyses in the alpha data populations, is that it has consistently demonstrated that the statistical distributions of the alpha values are significantly different in the crop circle samples compared with those from the controls. For the purpose of illustrating these differences for the reader of this report, previously examined sample sets were chosen in which the original examinations did not provide a high verification or probability of a genuine formation (see Report #11, sets KS-01-54 & 58). The alpha value frequency distribution in the bar chart and data table in Fig.2 (attached) depicts the Linda Howe control sample set (KS-01-58). These control data gave roughly a "normal" or "Gaussian", bell shaped curve (empirical data do not exactly fit the theoretical distribution). If the data were uniformly distributed on both sides of the mode, the "skewness" factor would be zero. In this case the calculated value is +0.337, which means the data are slightly shifted to the right of the mode (the plus sign is used because in some cases the data are shifted to the left of the mode and given a minus sign). In Fig.3 are analyzed data from the circle samples, and here we note an obvious shift far to the right with a skewness of +1.016 (lower table). In these particular sample sets it should be noted in the data tables that the mean values of the amplitude coefficients are essentially identical; however, in a high percentage of the wheat sets examined, the mean from the circle sample set is significantly higher than the controls. At the present, thought is being given as to how both the skewness and the statistics of the mean will enter into the final verification analysis.

Using data from the frequency distributions a total of nine control sets and six circle sample sets (from wheat) have been analyzed. The LMH sample set (KS-01-58) discussed above, and the companion set from Matthew Moniz (MM, KS-01-54) are included in the data summarized below;

Table I.
Skewness analyses of amplitude coefficients in wheat bracts.

Sample Origin	Mean Skewness	
Controls (N=9)	-0.088	s.d. 0.364
Formations (N=6)	+1.017	s.d. 0.618*

*-P<0.01

These data provide highly significant evidence that the crop circle bract tissues have been influenced by the external energies. From the standpoint of verification, five of the six skewness values in the formation data were two sigma limits outside the controls - this means that 83% of the crop circle samples can be defined as genuine, with better than a 95% confidence level. As more data are added this level of confidence may improve or decrease.

One last important point to be made here is that the control data include both lodged and upright plants. An examination of the KS-01-36 series (see Report #9) from the "artificial formation" gave a skewness value of +0.303 in the upright controls and -0.286 in the man-trampled plants; both values well within the control range (see Table I). This means that trampling, lodging etc. does not influence the amplidude coefficients in the same manner as the crop circle energies.

In the most recent work it has been very gratifying to note that oats (Canadian samples) demonstrate even more pronounced differences between the control and formation plants than was noted in the wheat. More will be said about this at a later date when the analyses have been completed.

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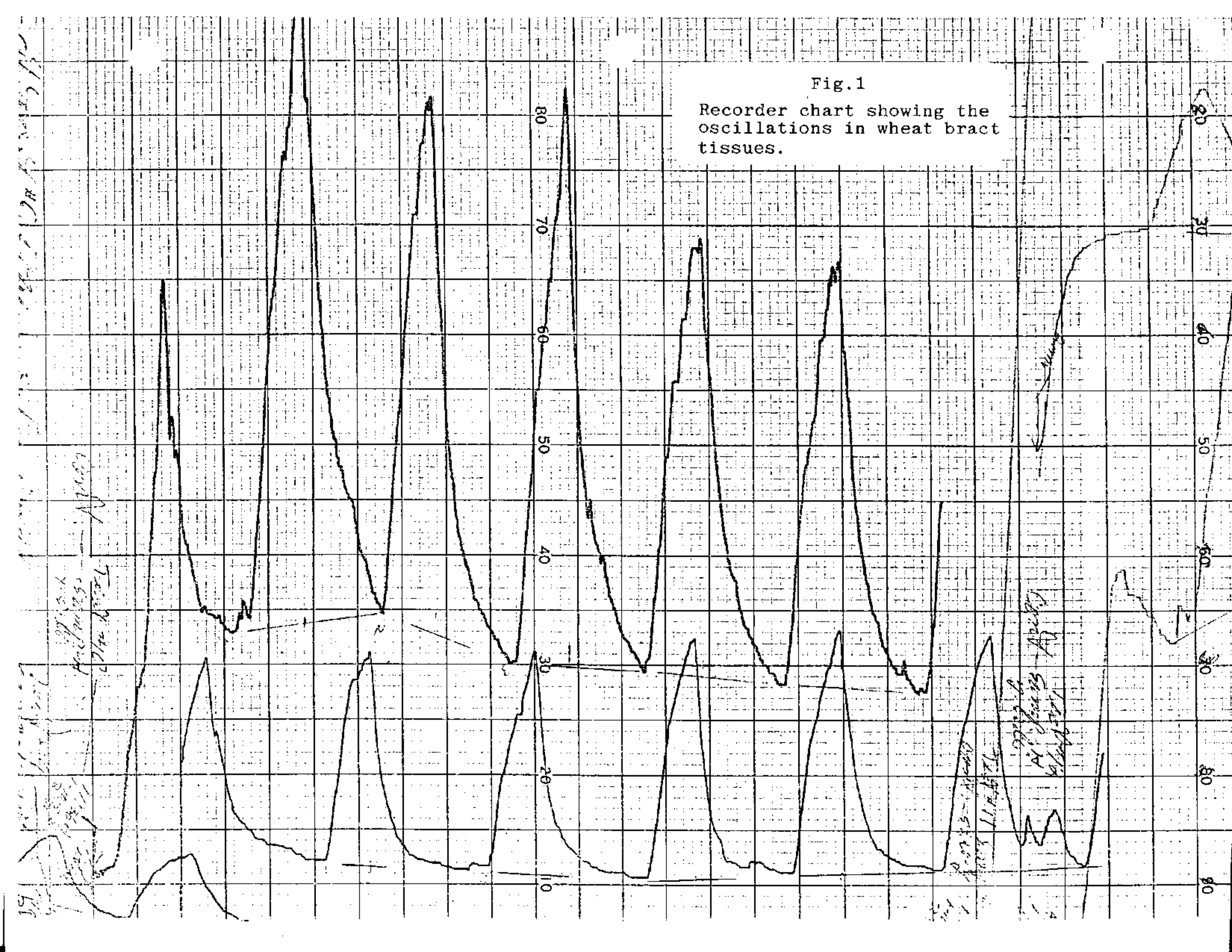
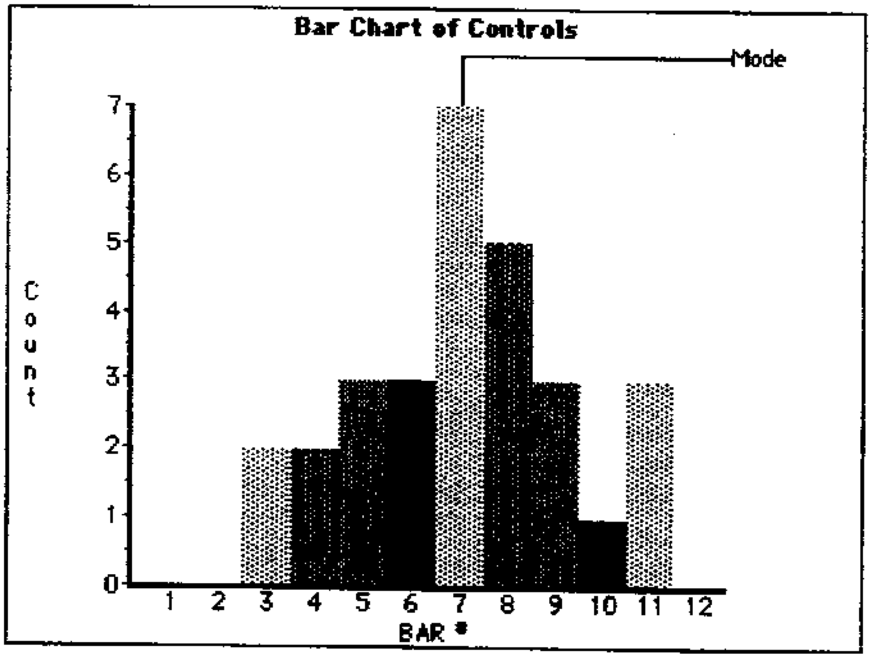


Fig.1

Recorder chart showing the oscillations in wheat bract tissues.

Fig.2

Controls-Olivers Castle (KS-01-58)
Frequency Distribution Analysis of OSC-Amplitude Coefficient from 6-tests (N=30) using the LMH samples.



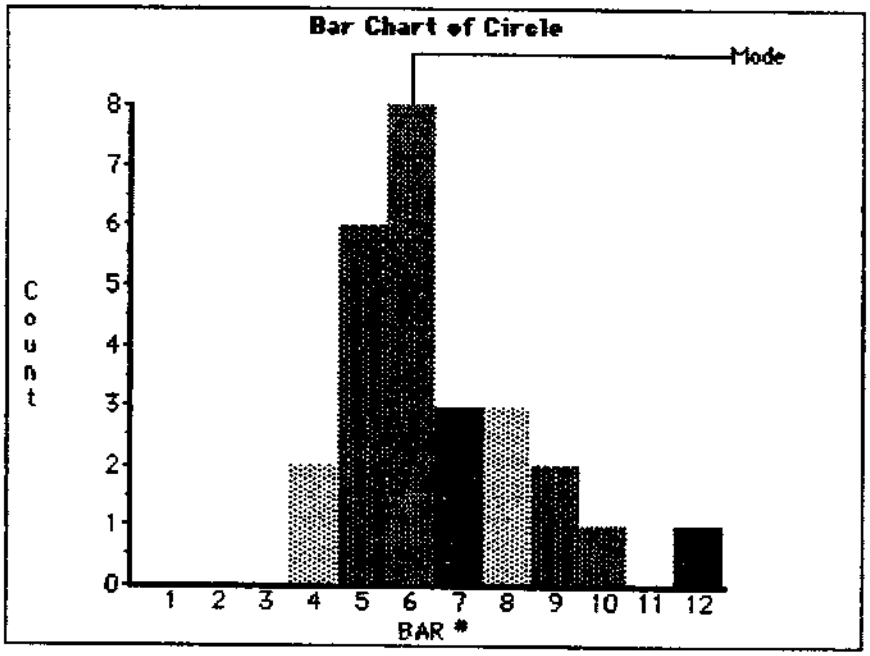
Bar=0.015

Controls

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
.102	.035	.006	.001	34.556	30
Minimum:	Maximum:	Range:	Sum:	Sum Squared:	# Missing:
.041	.186	.145	3.054	.347	0
Kurtosis:	Skewness:				
-.326	.337				

Fig.3

Circle-Olivers Castle (KS-01-58)



Circle

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
.104	.044	.008	.002	42.366	30
Minimum:	**Maximum:**	**Range:**	**Sum:**	**Sum Squared:**	**# Missing:**
.049	.198	.149	3.125	.382	0
Kurtosis:	**Skewness:**				
-.122	1.016				