

## INFORMATION

### AUTHORS

The *Tree-Ring Bulletin* will appear four times a year and will publish papers which are the results of original research on tree rings in their relation to climatology, and to other subjects. No paper which has already appeared will be accepted.

Manuscripts should be typewritten in double spacing. The Editor reserves the privilege of returning to the author for revision approved manuscripts and illustrations which are not in the proper form for the printer.

In reporting tree-ring data authors are requested to submit their data in a table such as appears on the back page of this number. This will cut the cost of publication very greatly.

Until funds are available authors will be requested to pay the cost of illustration which may be line cuts or half-tones, but must be drawn or printed on white paper, and mounted with paste, not glue.

Each author will be given, free of charge, twenty-five copies of the *Bulletin* in which his article appears. Reprints may be procured at cost with or without covers if ordered at the time the galley proof is submitted.

Manuscripts and illustrations should be sent express prepaid or by registered mail to the Managing Editor, Dr. Harold S. Colton, Museum of Northern Arizona, Flagstaff, Arizona.

### SUBSCRIBERS

Should recent subscribers wish to complete their files of *Tree Ring Bulletin* by beginning their subscription with July 1934, Vol. 1, No. 1, please advise the managing editor immediately and the back issues will be forwarded. Subscriptions received at any time up to July 1935 will be so considered if the subscriber requests.

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Errata—On page 8, Vol. 1, No. 1, at the top of the table the eighth and ninth headings are confused and should read, "sap heart date," and "rings lost at outside," respectively.

## ACCURACY IN DATING—I.

### A. E. DOUGLASS

An important purpose of this *Bulletin* is to encourage a careful examination and report upon the essential features involved in dating and to place such information before other students working in the same field, for their aid or comment. To this end, the table on the last page has been arranged under various headings suggested by experience. We cannot yet be sure that it is in final form to give the best service.

Some features are so fundamental that they may be taken for granted in the table. For example, it is presumed that the tree rings are sensitive enough for dating purposes. This sometimes fails of recognition in one's early work. The tree ring chronology in its early days was derived from trees about five miles southwest of Flagstaff, Arizona, growing in favorable locations near Woody Mountain. Today we would call those rings "complacent, yet datable." We would add that such rings are safe and difficult rings to use in dating problems; safe, because double rings and missing rings in such records are very rare; and difficult because the rings are so much alike, one after another, that very small rings on which to base correct dating, are hard to find.

Fortunately a large proportion of the rings in prehistoric beams display superb dating qualities. The ancient pueblo Indians did much of their house building just outside the forest, at the lower edge, and sought their logs from the neighboring forest border, a part of the forest in which a vital struggle for moisture was unending. In such places, the variation in width from ring to ring is very conspicuous and double and false rings are more frequently encountered. Certain small rings are even absent in

some trees. The detection of doubles requires careful judgment, combined with the constant use of magnifying power of X40 to X60. The absence of a ring is discovered by comparing many specimens together, or by searching about the circuit of a section. In such rings well identified, the dating has the highest reliability.

All this is fundamental and constitutes the chief experience needed by the student in the identification of ring sequences. The best protection from error is "memory" dating: that is, going over a sequence until it is in the mind and then reviewing each specimen by memory. Thus the building of a local chronology may become more important than the dating of an individual piece, for it establishes the idiosyncracies, if any, of that particular locality. A statement of the number of missing rings gives an index of the difficulties of obtaining that date. On the whole, the errors from these sources are rare and largely disappear when the date is actually established.

Up to the moment of reaching an actual date of the sequence, the work has been a study of individual rings. Now it approaches the liaison zone between ring dating and archaeology and even climatology. The cutting date is desired by the archaeologist as desirable information regarding his ruins, and the age of the tree and its type of reaction by the student of climate. The weathering of logs and the breaking of charcoal interfere with reaching a true cutting date, more correctly called a "bark date," which mean simply the last growing year of the tree. Beams used in house structures for three or four centuries have lost part of their sapwood, and thus the final ring is not present. The loss may be gauged by taking the date of the beginning of the sapwood, that is, the sap-heart contact, and adding a correction for the probable total amount of the sapwood. This again is a somewhat varying quantity, and we need improved formulas for determining its amount. Extensive data have already been collected on this point. So, in the table of dates the sap-heart date is given when possible. A very important variable involved in the size of the sapwood is the mean ring size; hence in the table, data are supplied for computing this item.

The remaining factor that influences the estimation of cutting time is the loss of rings at the outside of the specimen. This can often be judged by the continuity of ring or rings around the outside circuit and hence it is important to know whether the specimen was a whole section or what fraction of a section, whether the outside was damaged, or the rings badly crowded, or if other conditions existed that made estimation of loss difficult.

Perhaps the most difficult cause for solution is the charcoal fragment. Here there is no sign of its sap-heart contact. If there is a good circuit, continuity of outside rings, that is, if the same identical ring can be traced around the circuit of the tree, then reason exists for estimating small loss, if any, at the outside. If the rings grow rapidly smaller at the outside, then there was probably little loss and the true date is not far off. The compensating feature in charcoal is the great number of pieces. Hence the value of "combing" a group thoroughly, and dating every possible piece, and then of plotting on a time scale the length of each ring series identified. Such a plot establishes relationship in time between fragments and points to approximate dates that have important value.

This, then, is the origin of the separate items in the table of dates. Filling in the table insures that the investigator has looked up and thought about these items which bear so heavily on accuracy in dating.