If on the basis of the facts mentioned it is permitted to attempt a correlation of the geological section obtained in Lake Bonneville with the generally accepted section of the late Tertiary and the Pleistocene it may be arranged as on page 140. Interglacial stages, except the Aftonian, are omitted.

This correlation does not conform with the accepted opinion that the Upper Lacustral clays of Lake Lahontan and the Upper Bonneville beds were laid down during the Wisconsin glacial stage; but the presence of an Aftonian fauna in the Lahontan beds forbids this accepted arrangement. Doubtless the objection will be raised that the Aftonian is thus made equivalent to a time of high water and therefore to a glacial stage. The procedure would appear less violent if the interval between the two Bonneville beds were regarded as Aftonian; but the Lahontan fossils are in the upper clays, supposed to be a product of a glacial stage. However, it appears not yet certainly determined that the times of high water coincided exactly with the times of the glaciers. Atwood was able to say only that moraines were in the Bonneville region before the last advance of the lake waters. This appears to indicate that the first rise of the lake may have preceded somewhat the formation of the oldest glaciers. In like manner a part of the Upper Bonneville beds may have been laid down before the culmination of the Kansan glaciers and these may have left no moraines in the Wasatch Mountains. It is also possible that the Aftonian camels, horses and tigers lived some time after the beginning of the Kansan glacial stage. Reference of the Upper Bonneville beds, in part to the first interglacial stage, in part to the Kansan, makes it necessary to place the older glaciation in first glacial time, the Nebraskan.

The age of the Provo beds and of the later glacial phenomena in that region is uncertain and they may really be included in the late Pleistocene, possibly in the Wisconsin stage.

Dr. Willis T. Lee has called attention to the fact that recent borings exhibit no changes in character to indicate that the lower parts of the beds are pre-Bonneville in age (Bull. U. S. Geol. Surv. 352, pp. 68, 69). Deep wells show that the Lake Bonneville deposits reach a thickness of 2,000 feet or more.

In 1922, Dr. Warren Upham, who has had wide experience in the investigation of glacial problems, published a paper on *Stages of the Ice Age* (Bull. Geol. Soc. Amer., vol. XXXIII, pp. 491-514). The following extract is quoted from his discussion of Lakes Bonneville and Lahontan (p. 495):

Comparing the fluctuations of the western lakes and glaciers with those of the North American ice-sheet, we may confidently refer the prolonged first high stage of the lakes to the Nebraskan stage of far-extended ice accumulations; the time when the lakes disappeared under a drier climate is represented by the Aftonian stage of wide recession of the ice-sheet; and the second rise of the lakes occurred probably during the time of culmination and final disappearance of the ice-fields.

It is Upham's opinion that the Nebraskan time far exceeded the combined Kansan, Illinoian, Iowan and Wisconsin stages, in a ratio of not less than five to one. Other glacialists regard this estimate as giving too much importance to the Nebraskan.

In volume XXXIII, on pages 541 to 552 of the Bulletin of the Geological Society of America, Dr. O. E. Meinzer published an interesting paper entitled