

be added the unknown equivalent of the time consumed in the cutting-down that began towards the end of the copper culture and deepened the valley 20 feet. While we have no determination of the rate of this deepening of the valley, we may assume that, being dependent on the compensatory orographic process of load-shifting, it was neither spasmodic nor unduly rapid. Even if we should assume what would seem an improbable rate of 2 feet per century, this 20 feet of cutting-down would require 10 centuries, the equivalent of 20 feet of culture-strata. Even this, added to the 30 feet equivalent of the aggrading, would insert the time-equivalent of 50 feet of culture-strata between the beginning of the cutting-down and the founding of Anau. A slower rate of cutting would lengthen the gap and time.

Of the 30 feet required as the minimum culture equivalent of the aggrading, 14 feet belong before the iron culture, and represent that portion of the gap between copper and iron. Also, for the cutting-down of at least 20 feet, we have only the last 8 feet of copper culture-strata. From these geological considerations it is clear that the gap between the copper and iron is very considerably greater than the 14 feet determined by the aggrading.

Having explained the available geological factors, let us see what the copper culture itself offers. While the whole of this culture was characterized by an abundant use of copper for ornaments, domestic implements, and weapons of the earliest forms, not only was tin not used for hardening the metal, but, with the single exception of a ring, it did not occur in any of our finds until towards the end. Therefore these people lacked not only knowledge of full tin-bronze (9 to 10 per cent tin), but they were not even in the transition stage in which smaller percentages of tin were used intentionally in cutting-implements.

Now a large proportion of our copper finds in the South Kurgan, including cutting-implements, daggers, etc., were found in intimate association with objects belonging to civilizations in the Chaldean sphere of influence, especially the associated figurines of naked Ishtar and of the cow or bull. We do not know how early full tin-bronze or even the lower alloy was known in Babylonia, but this knowledge could not fail\* to be nearly contemporaneous in Babylonia and Egypt. Montelius, after a careful survey of the whole field of existing knowledge of the subject, decides that the use of full tin-bronze (9 to 10 per cent of tin) came into Egypt in the XI or XII dynasty, and that small amounts of tin are found in objects of the earlier dynasties. The probable Central-Asiatic origin of the lapis lazuli used in Egypt at least as early as the XII dynasty is, to the extent of that probability, evidence of commercial relations between Egypt and Babylonia. The most conservative chronology—that of the Berlin schools—places the beginning of the XII dynasty at 2000 to 2200 B. C., and we are warranted in accepting this as about the date of the introduction of full tin-bronze in Mesopotamia. In view of these considerations I have felt justified in placing the end of the copper culture of the South Kurgan at 2200 B. C., as the latest probable date, and have left in the column a gap equal in feet to the requirements of this determination.

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\*According to Montelius, 1900, no tin has been found in any of the older objects of copper from Tello and other Babylonian localities. It has been found in objects from graves at Ur and Erech, which range from the second half of the III to the end of the II millennium.