

and its influences, the *substantia compacta* of the bones in all ruminants loses in hardness and weight, making the *spongiosa* more prominent. A further proof exists in the deep furrowing and roughness of the exterior of the cores, which is always an evidence of adult age.

In ascending through the culture-strata the horn-cores of the sheep become smaller and more slender and, in the larger forms, almost two-edged in cross-section. The conclusion is easy to draw that we have here the successive remains of the domesticated wild sheep, gradually altered in character through the process of domestication, which began with the taming of the ancestral form represented in the lower culture-strata.

Ovis aries palustris Rüttimeyer. (See plate 75, fig. 2; plate 76, figs. 5-7; plate 83, fig. 2.)

The sheep represented in the fully preserved calvarium (No. 21) from +23 feet in the æneolithic culture-strata Ib is, according to all the characteristics of the horn-cores, which are two-edged along almost their whole length, an *Ovis aries palustris*, a "turbary sheep" of Rüttimeyer, in a form which closely resembles those found by Studer* and by Glur† in the Swiss lake-dwellings of Lake Biene. It is a form with a little larger horn than those of this breed still living in Wales and Iceland and in small numbers in the mountains of the Grisons. But is it possible that a tame turbary sheep (Torfschaf) can have originated from a wild *Ovis vignei arkal* Lydekker?

In a former memoir Gaillard and I‡ undertook to show that C. Keller§ was wrong in his view that the turbary sheep was derived from the African Barbary sheep (*Ammotragus tragelaphus*). We reached the conclusion, then, that *Ovis vignei* must have been the ancestral form of the turbary sheep, and although we had at that time no direct proof to offer, it must be the case on account of the horns, which present the distinguishing, if not the only, characteristic of the turbary sheep.

The horns of the Barbary sheep develop, according to my investigations on more than twenty heads of young lambs of *Ammotragus tragelaphus*, in round and cone-shaped structures which retain the conical form till late old age. In the turbary sheep (at least that which C. Keller considers to be the so-called Nalpser-schaf, from the Alp-Nalps in Canton Grisons) the young horn is pressed wholly flat and scabbard-like. I have confirmed this on individuals which C. Keller himself bought for the zoological park of Zürich, and which later came to me by purchase and are now in my experimental flock, where they are being studied with reference to the question of their derivation. Further, this peculiarity is clearly recognizable in the English turbary sheep of Wales and the Hebrides.

Now, the lamb and the female of *Ovis vignei* show the same form of horn-sheath, as will be seen in the picture; but since my researches on the origin and

* Studer, Th., Die Tierwelt in den Pfahlbauten des Bielersees. Mitteilungen Naturf. Gesell., Bern, II Heft, 1882.

† Glur, G., Beiträge zur Fauna der Pfahlbauten. Mitteilungen Naturf. Gesell., Bern, 1894.

‡ Duerst & Gaillard, Studien ueber die Geschichte des aegyptischen Hausschafes. Recueil de travaux relatifs à la philologie et l'archéologie égyptiennes, vol. xxiv, pp. 44-76. Paris.

§ C. Keller, Die Abstammung des Buendnerschafes und Torfschafes. Schweiz. Naturf. Versammlung, Chur, 1900.—Die Abstamm. d. ält. Haustiere. Zürich, 1902.