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THE USE OF HORN SECTIONS TO DETERMINE THE AGE OF SABLE *HIPPOTRAGUS NIGER*

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Age determination techniques were intensively investigated during a population dynamic study on sable *Hippotragus niger* (Grobler 1978 *Population dynamics of sable in Rhodesia*. D.Phil. Thesis, Univ. of Rhodesia). A useful technique emerged which could probably be applied to other horned ungulates in Africa. The basis of the technique is supported by the fact that the growth of the horny sheath in Bovidae is not continuous but more or less periodic (Thompson 1917, *On growth and form*). This causes the sheath to be composed of a series of all but separate rings which may be formed annually. Horns receive their increments at the lower extremity and continue to grow throughout life (Ogilby 1840, *Trans. zool. Soc. Lond.* 33–67).

Horn structure and form might be described as a series of stacked cones, one fitting into the other. Horn growth is characterised by three phases:

(a) the formation and subsequent exfoliation of a deciduous horn;
(b) the rapid growth of the primary permanent horn; and
(c) the slow post mature or secondary permanent horn growth.

Because horns are in the form of "stacked cones", sections were cut from the base to the tip in expectation of finding incremental lines. In the case of the sable, incremental lines were found occurring at a maximum about two thirds of the way up. Transverse sections or cross sections of approximately 1 mm thick were cut between the bumps, on the outer curve and using a thin hacksaw blade. Full sections or half sections may be cut depending on choice. The section was then ground down manually on carborundum crystolon grit using grades '80', '500' and '600', on a glass base. This method is commonly used to prepare geological specimens for microscopic examination. The sections were ground down until the incremental lines were clearly visible to the naked eye when held to a light. The "wet" section could be examined immediately, placed in a suitable container for later examination or mounted on a slide using Canada Balsam.

Another method used to prepare permanent slides was to grind down one side of the section until smooth, this side was then fixed to a glass slide using Linsite cement. Once the cement had dried, which could be speeded up by placing on a hot plate, the rough surface of the section was ground

down to the required thickness. The best technique for examining the prepared sections was to place them on glass with a light underneath, much in the same way as one would look at colour transparencies.

The deciduous horn of sable showed a clear matrix (A) as opposed to the dark matrix (B) of the permanent horn (Fig.1). The primary perma-

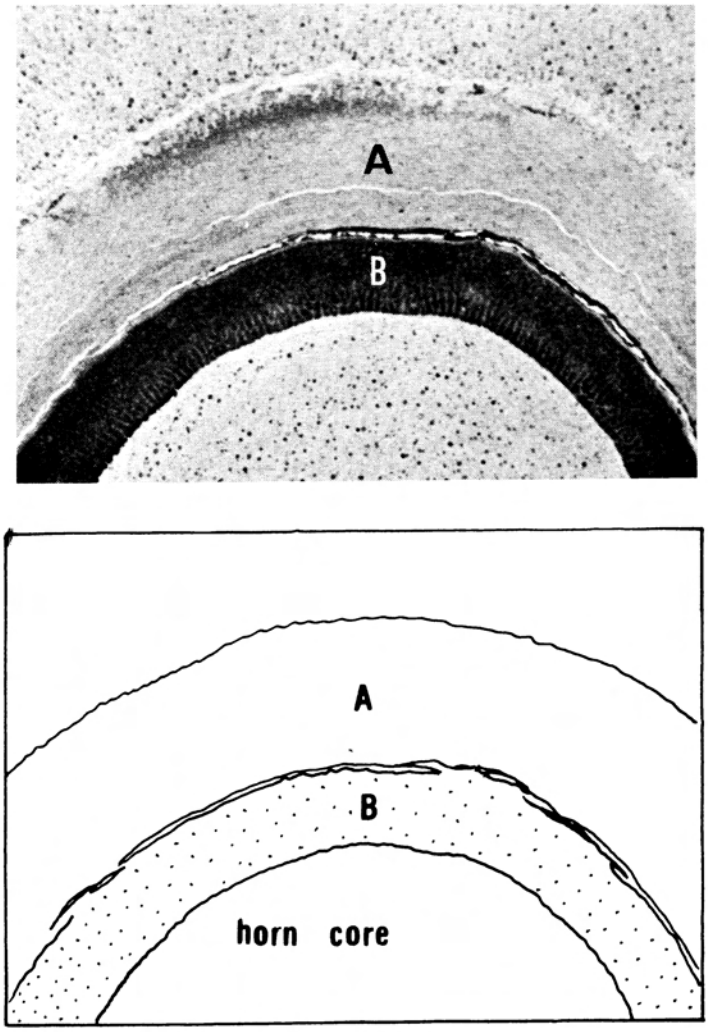

Fig. 1. Transverse section of young sable horn showing the deciduous layer (A) with light matrix and the first layer of the primary permanent horn (B) with a dark matrix. The line along which exfoliation takes place separates the two.

nent growth had relatively broad bands (B1, B2, B3) and distinct growth checks (arrows) as shown in Fig. 2. These were confirmed as annual checks from known-age individuals collected in the field. Generally thinner growth checks were present in the secondary growth, indicated as a–h in Fig. 3. The first three of these were confirmed as annual layers from known-age animals, any additional layers were therefore taken as annual lines.

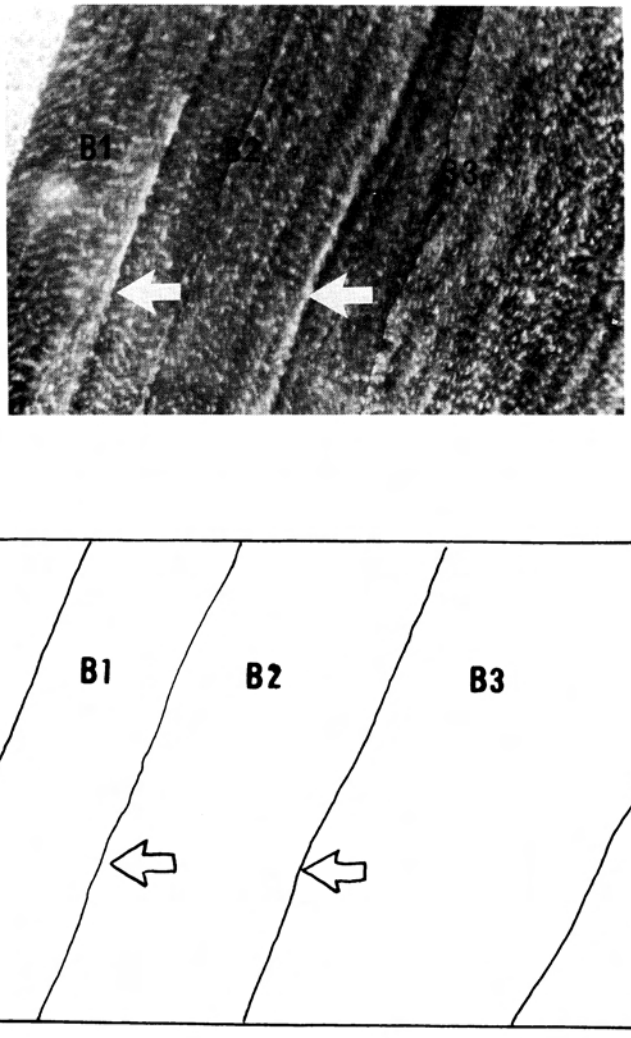

Fig. 2. Transverse section of a mature sable horn showing growth checks (arrows) separating the three layers (B1–3) of primary permanent growth.

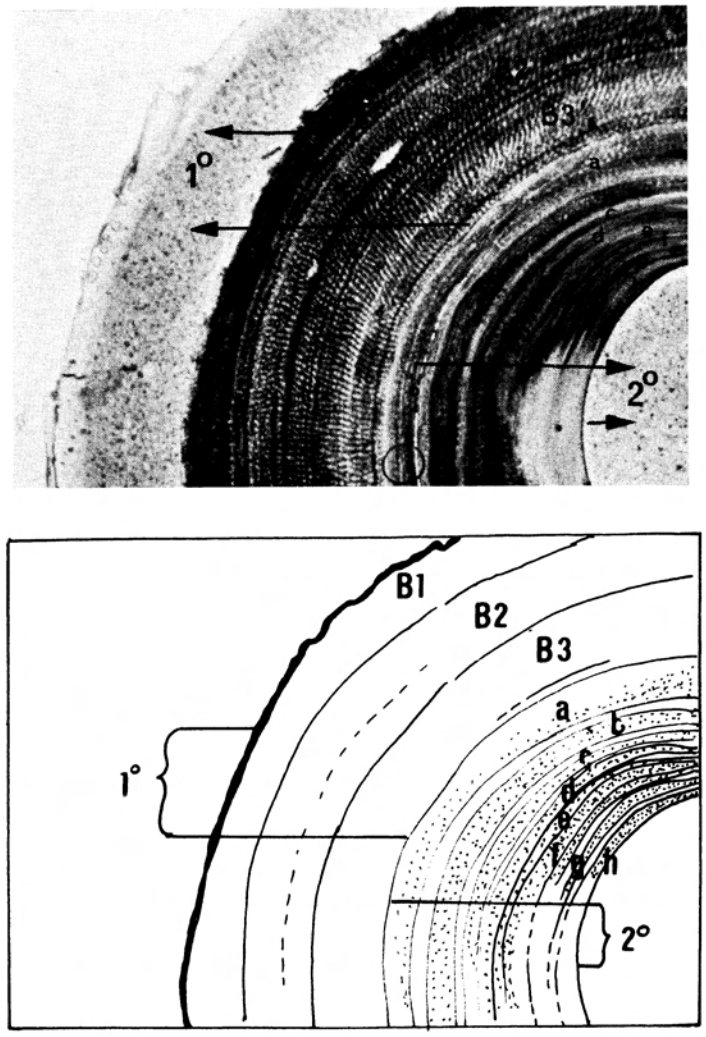

Fig. 3. Transverse section of an old sable horn showing primary permanent growth (1°) and advanced secondary growth (2°). Growth checks in the latter are indicated in lettering (a–h).

Smaller, less distinct lines appeared between the main growth checks and these were probably caused by factors such as calving, illness, etc. In very old animals the lines were not always clear due to compaction of the layers but this represented a small percentage of the overall sample. To determine the age of an individual, the number of lines in the section were counted (maximum of three in the primary growth then one year added to compensate for the loss of the deciduous horn. If the lines in the primary growth were obscure, but secondary growth was present, the lines in the

latter were counted and four years added to determine the age. This proved a reliable yet easy technique for absolute age determination of adult sable.

The same technique was applied to a small sample of gemsbok *Oryx gazella*, impala *Aepyceros melampus*, wildebeest *Connochaetes taurinus* and *C. gnou*, buffalo *Syncerus caffer*, kudu *Tragelaphus strepsiceros*, duiker *Sylvicapra grimmia*, klipspringer *Oreotragus oreotragus*, mountain reedbuck *Redunca fulvorufula*, blesbok *Damaliscus dorcas*, springbok *Antidorcas marsupialis* and red hartebeest *Alcelaphus buselaphus*. All except the kudu and the blesbok showed distinct incremental lines, particularly in the secondary growth. A clear matrix in kudu and blesbok horns obscured the incremental lines. A little experimentation was required for each species to find the best area for sectioning the horn.