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First record of a fossil *Cervus elaphus* L., 1758, from Albania

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In 1978 a fragment of a fossil deer skull was discovered at a depth of 1.5 metres in peaty sediments of the Tarovica swamp near Lezhë, South of Shkodër in N. W. Albania, during drainage work. Initially placed in the Lezhë Ethnographical Museum, it is now inscribed in the collection of my laboratory as number 78/1.

The Tarovica swamp between Bushati and Lezhë near the Adriatic coast is several kilometres long and lies a few hundred metres above present sea-level between the North-to-South running mountain ranges of Rrenci-Barbullushi (nearest the coast) and Köles-Kakarriqi. Its peaty sediments overlie lowermost Tertiary Nummulitic, and Cretaceous Rudist limestones. Quaternary sediments such as this peat are present in many Albanian areas (Bourcart 1919, 1925; von Nopsca 1929; Nowack 1929). Until now no fossil remains of large mammals appear to have been recorded from these areas.

The fossil in question is a relatively well-preserved, but recently damaged skull fragment (Fig. 1) consisting of an incomplete neurocranium with partially preserved antlers. The left antler is broken off at the base of the bez (or second tine); the tip of the browtine (first tine) is absent. The right antler's beam is broken near the base of the fourth tine; tips of the browtine and bez are no longer present. The cranial bone has a chestnut-brown colour with cream-coloured spots. Outer surfaces of warts and pearls are off-white. The dirty rust-brown colour of the deeper parts of the antlers has undoubtedly been caused by humic acids from the peat.

A sample of a few milligrammes from the antlers and the skull was used for quantitative nitrogen analysis according to the Kjeldahl method. It was carried out with the idea (Cantaluppi 1973; Fistani 1988) that the break-down of bone matrix as a reflexion of age of a fossil can be expressed as a decrease of its nitrogen content. The Tarovica specimen gave a result of 2.069 % N. An Upper Pleistocene age does therefore not seem impossible.

The occipitalia in the skull fragment are well preserved (Fig. 1; 4). Occipital width exceeds height, indicating a strong individual. The upper edge of the nuchal linea forms a ridge. The complete long axes through the occipital condyles form angles of about 45° with a horizontal line through the foramen magnum. An occipital torus separates the left and right supra-occipital regions. The outline of the foramen magnum at the junction of the condyles with the basi-occipital (Fig. 1; 3) is similar to that described by Kotsakis et al. (1978) for *Cervus rianensis* and apparently different from that in (most) red deer. The two condyles form an angle of ± 90° with each other in the Tarovica and Riano specimens. Some cranial and antler measurements ot the Albanian specimen are given in Table 1.

The tympanic bullae are distinctly separate from the fused basi-occipital/basi-sphenoidal, typical for *C. elaphus*, although there exists a considerable degree of individual morphological variation. The Tarovica fossil has a large, flat, rugose area near the acoustical porus and differs in this respect from the specimen in Fig. 26 in the monograph by Flerov (1952).

The considerable distance between occipital arc and shortest length between the two pedicels attests to the robusticity of the fossil. Fronto-parietal sutures are fused. The

frontal suture midway between the pedicels is partly synostosed. The Tarovica animal therefore attained a fairly high age. Seen from behind (Fig. 1; 4) the two pedicels form an angle of approximately 95° with each other. Each one has an almost ovoid cross-section. Their height is surpassed by that of *Cervus* specimen no. 636 from Torre in Pietra (Palombo, in Caloi 1978). Left and right browtines stand parallel to each other and to the sagittal axis of the skull. The edge of each burr forms a wavy plane (Fig. 1; 1). The stout burrs contrast with the relatively thin pedicels. The very high value for the beam/browtine angle again underlines the robusticity of the Tarovica specimen.

Bouchud (1972) warned against proposing a separate subspecies when only scanty material is available. Bearing this in mind there is no good reason to go beyond a general identification of the Tarovica find as *Cervus elaphus* Linnaeus, 1758. It was a very large, robust and healthy animal, living under optimal conditions.

Some authors are of opinion that a progressive increase in size can be observed among red deer from the Lower to the Upper Pleistocene (for example Vereshtchagin 1959 or Prat and Suire 1971). Others (see Erdbrink 1964 for a compilation) conclude that European fossil *C. elaphus* were neither stronger nor larger than recent red deer. Large size is only a result of optimal ecological conditions, expressed by measurements such as the

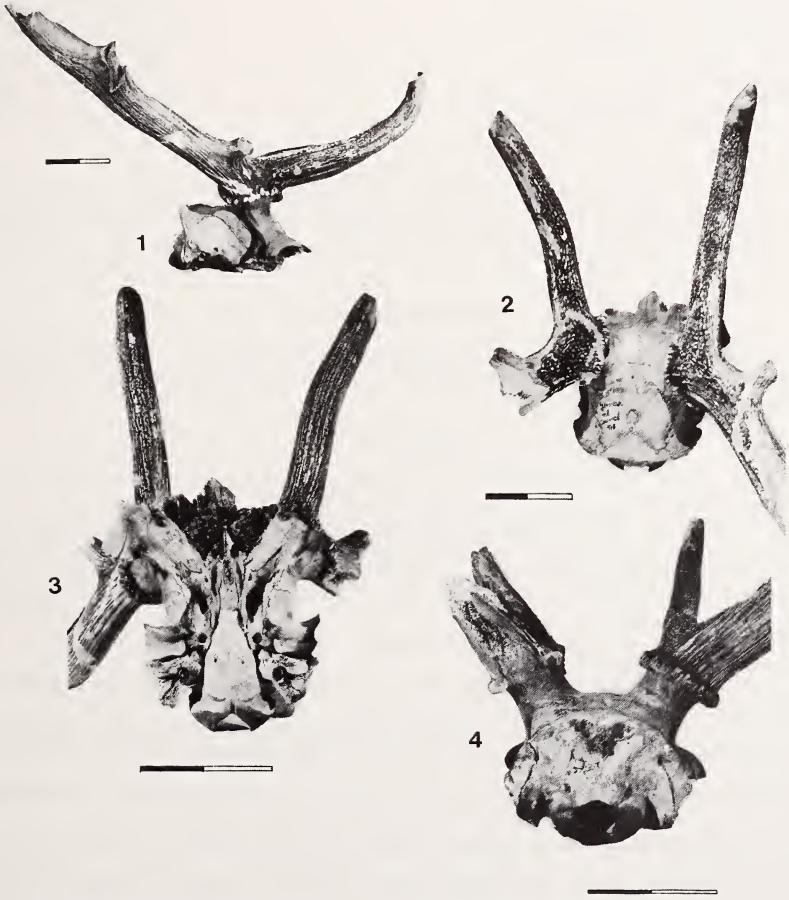

Fig. 1. Incomplete skull of *Cervus elaphus* L., Tarovica, Albania. 1: Right lateral aspect; 2: Aspect from above; 3: Aspect from below; 4: Aspect from behind. (Bars: 10 cm)

Table 1. **Cranial and antler measurements of *C. elaphus* L. from Tarovica, no. 78/1**
Measurements in mm

Occipital height	94.0
Occipital width	147.4
Width between condyles	72.7
Sagittal diameter of foramen magnum	33.0
Transverse diameter of foramen magnum	31.0
Transverse width of skull between parieto-temporal sutures	111.0
Minimum external width between pedicels	170.0
Minimum internal width between pedicels	54.0
Transverse width between upper orbital edges	117
Distance between supraorbital foramina	87.2
Maximum diameter of supraorbital foramen	9.5
Remaining length of right beam	420
Hypothetical length of entire right antler	580–600
Cross-section of right beam at base, sagittal × transverse	48.0 × 48.7
Cross-section of right beam at 150 mm above burr, sagittal × transverse	45.6 × 45.0
Cross-section of right browtine, sagittal × transverse	39.4 × 35.0
Cross-section of trez (3rd tine), sagittal × transverse (dextra)	40 × 32
Height of pedicel	dext. 30.5; sin. 29.4
Anterior posterior diameter of pedicel	dext. 49.3; sin. 51.5
Transverse diameter of pedicel	dext. 47.7; sin. 48.1
Anterior posterior diameter of burr	dext. 82.6; sin. –
Transverse width of burr	dext. 74.5; sin. 73.2
Length of browtine along upper incurvation	dext. 270.0; sin. 230.0
Angle between beam and browtine	dext. 136°; sin. –

angle between beam and browtine. Application of Bergmann's rule (1847) is not necessary in order to explain the large size of a red deer by supposing that it lived during a cold phase of the Pleistocene. On the other hand, such an influence should not be ruled out either.

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