

THE CHINKARA (*GAZELLA BENNETTI*) IN IRAN, WITH THE DESCRIPTION OF TWO NEW SUBSPECIES

C. P. Groves

Department of Archaeology and Anthropology, Australian National University, Canberra, Australia

Abstract

The distribution of *Gazella bennetti* in Iran is reviewed. The species is commonly said to be confined to the southeastern part of the country, but is actually widespread over suitable areas, east of the Zagros Range and south of the Alborz. In the north and west of this range, there is a hitherto undescribed subspecies, which is named and diagnosed for the first time in this paper; its similarity in colouration to the commoner *Gazella subgutturosa* doubtless accounts for the failure of specialists to record its existence previously. A further new subspecies, confined to the region of Bushehr, is also named and diagnosed.

Introduction

In 1873, Blanford described a new species of gazelle, *Gazella fuscifrons*, from Iran, on the basis of a female from "Jalk, on the southern edge of the Sistan desert, Baluchistan, 3000 feet" (this is at 27.35 N, 62.33 E). At the same time, however, he noted the resemblance of his new species to the Chinkara, *G. bennetti*, of India, and ascribed a gazelle from Bampur to the Indian species. On evidence supplied by a Major St. John, he suggested that gazelles near Bushire were also of the species, being redder than *G. subgutturosa* (the only species hitherto known from Iran) and with horns in the female which *G. subgutturosa* lacks.

Later, however, Blanford [26] revised his opinion of the distinctness of *G. fuscifrons*. "Sir O. B. St. John", he wrote, "after a long search, obtained what he justly concluded must be the male, and this proved to be *G. bennetti*".

Lydekker [7a] described another new gazelle from Iran, from the Kain Desert (Qa'in or Qayen, 33.44 N, 59.06 E), under the name *G. yarkandensis kennioni*, but

with some misgivings that it was really any different from *G. fuscifrons*. Three years later [7b], he described a new gazelle, *G. hayi*, supposedly from Algeria; but subsequently admitted that two labels had been inadvertently switched and he had actually redescribed *G. fuscifrons* [7c]. Gazelles from southeastern Iran had now received three names!

The influential checklist of Ellerman and Morrison-Scott [3] synonymised all these names with *bennetti* from India, which was referred to the species *G. gazella* as an eastern subspecies. Groves [5a], on the other hand, considered that the relationships of the chinkara were rather with *G. dorcas*, and that more than one subspecies could be recognised in the *bennetti* group; the Iranian subspecies was thus resurrected as *Gazella dorcas fuscifrons*.

Harrington [6] adopted the allocation of the chinkara to *G. dorcas*, but for the first time since Blanford recognised two subspecies in Iran: *G. d. bennetti* ("the Chinkara") from the southeastern coastal plain (the Makran coast), and *G.d. fuscifrons* ("the Jebeer") from the central desert hills.

Keywords: Gazelle; Taxonomy; Chinkara; Jebeer

Finally, Groves [5b] restored *G. bennetti* to specific rank, and this decision was corroborated by Furley *et al.* [4], who found that the karyotype was more different from those of *G. dorcas* and *G. gazella* than these are from each other.

In the present paper, the taxonomy of *G. bennetti* in Iran is considered in detail on the basis of examination of as many specimens as appear to be available in the world's museums.

Materials and Methods

Skins and skulls of *G. bennetti* from Iran and elsewhere were studied in the Natural History Museum, London (BM); the U. S. National Museum, Washington, (USNM); the Field Museum of Natural History, Chicago (FMC); the Rijksmuseum van Natuurlijke Historie, Leiden (RML); the Zoologisches Museum A. Humboldt, Berlin, (ZMB); and the Museum Melli-e Tarikhe Tabii, Tehran (MMTT). Photos of the types of the two taxa described by Lydekker (see above) were kindly supplied by Ms Daphne Hills of the Natural History Museum, London.

Skull measurements were analysed by both univariate and multivariate methods. The multivariate analyses were performed using SPSS Discriminant Functions on the UNIX computer at the Australian National University, Canberra.

Results and Discussion

There is a clear division between specimens from western and eastern Iran, and a specimen from Bushehr, on the Persian Gulf, is different again. The western subspecies is larger and noticeably lighter in colour, and lacks the dark midfacial region of the eastern race; while the Bushehr subspecies is extremely small in size with widely flared horns. The three subspecies are as follows:

Gazella bennetti fuscifrons Blanford, 1873

1873 *Gazella fuscifrons* Blanford, Proc. Zool. Soc. Lond., 318. Jalk, southern fringe of the Sistan Desert.

1908 *Gazella yarkandensis kennioni* Lydekker, Field, 111: 499. Kain district (Qayen), northern edge of Sistan.

1911 *Gazella hayi* Lydekker, Proc. Zool. Soc. Lond., 961. "Algeria": actually from Sistan.

1977 *Gazella bennetti* Harrington, A Guide to the Mammals of Iran, 68.

Type: In Indian Museum, Calcutta (not seen, perhaps no longer extant).

Diagnosis: Horns long, more or less upright, with narrow spread, tips not turning in; braincase relatively short, flat;

premaxilla long, slender, curved. Nasal bones broad, both anteriorly and posteriorly. Skull profile convex. Toothrows bowed outward, incurved anteriorly; teeth relatively large, auditory bullae large. Colour in winter dark greyish sandy, often with a distinct brown band edging the white of underparts; in summer, brownish bay-fawn. Face markings well-developed; forehead dark brown or grizzled black; a conspicuous nose-spot; light face-streaks whitish.

Specimens seen are as follows:

MMTT 621 (3 km S of Konarat, Baluchistan, 25.21 N, 60.25 E), skin and skull, adult male;

MMTT 629 (100 km south of Lar, near Hormud), skin and skull, adult female;

BM 1935.12.21.8 (Gumazgi, 31 km west of Turbat, Makran), skin and skull, adult male;

BM 85.760 (Hoshab, Makran), skull only, adult male;

BM 66 (Nasirabad, Turbat), skull only, adult male;

BM 10.12.53.3 (Sistan), skull only, adult male;

BM 68.854 (Sistan), skull only, adult male;

BM 6.1.2.14 (Sistan), skull only, adult male;

BM 1909.11.17.2 and -3 ("Bujnurd, Sistan"? = Bojd, 32.54 N, 59.16 E), skulls only, adult female;

BM no number (Pasni, Makran), skull only, adult female;

BM 8.3.12.1 (Qayen, 33.44 N, 59.06 E), mounted head only, adult male, type of *Gazella yarkandensis kennioni* Lydekker.

BM 10.1.22.1 (Sistan), mounted skin, adult male, type of *Gazella hayi* Lydekker.

USNM 328577 (Chah-Bahar coast), skin and skull, adult male;

USNM 329354 (Zahidan, Baluchistan, 29.32 N, 60.54 E), skin and skull, adult male;

USNM 328578 (Chah-Bahar coast), skin and skull, adult female;

USNM 328579 (Bampur, Iranshah), skin and skull, adult female;

FMC 97895 and 97896 (both, Bampur, 27.13 N, 60.28 E), skulls only, adult male.

An unlocalised skin (RMNHL, no number) from "Persia", from Rotterdam zoo, also belongs to this race.

Outside Iran, this subspecies occurs in Pakistan: BM 1885.6.13.3 (Sind), BM 1935.12.21.4 (Chak, Sukkur, Sind),

BM no number (Gajar Onashki), skins only, and BM 626 (Chak Sukkur, Sind), skull only, adult female; and probably

also in Rajasthan, India.

Notes: The type of this subspecies was not found by me on a visit to Calcutta. Bentham [1], however, gives its measurements as follows: horn length 190.5 mm, tip-to-tip 82.5, skull basal length 178, "skull breadth" (actually

breadth across horn bases) 57 (measurements transposed from inches, and checked for consistency on the basis of two Indian skulls whose measurements are also given by Benthams and which are still in the collection).

The type of *Gazella hayi* Lydekker is much faded, retaining little of the dark colour of the midfacial region referred to by the describer and well shown in early photos (Lydekker, [7b:961]; Lydekker and Blaine, [7c:50], although there is no doubt that it is the same specimen. The type of *Gazella yarkandensis kennioni* Lydekker (described under the mistaken impression that it was the local representative of *G. yarkandensis*, nowadays regarded as a subspecies of *G. subgutturosa*) is a mounted head-skin; it too is exceedingly faded, and the colour resembles that of the type of *G. hayi*; but in its spreading horns (span 175 mm), somewhat inturned at the tips (tip-to-tip distance 150 mm) it approaches the next subspecies.

Gazella bennetti shikarii n. subsp.

1977 *Gazella dorcas fuscifrons* Harrington, A Guide to the Mammals of Iran, 52.

Type: MMTT 631, from Kavir National Park, Iran, adult female skin and skull, collected by Sator Assadi and Brian O'Regan. The specimen is misidentified on the labels and in the catalogue as a male *Gazella subgutturosa* (see below).

Diagnosis: Compared with *G. b. fuscifrons*, horns more depressed, on average more widely spread (Figs. 1, 2), with tips slightly inturned (Fig. 3). Braincase relatively long, steep (Fig. 4); premaxilla nearly straight, thicker and shorter than in *G. b. fuscifrons* (Fig. 7). Profile straight (Fig. 4). Toothrows nearly straight, not bowed outward (Figs. 5, 6); teeth relatively small (Fig. 8); bullae relatively small; nasals typically become narrower anteriorly. Colour very light, reddish-sandy; underside whiter. Facial markings less expressed; no marked nose spot, forehead not dark. Larger in size.

Specimens seen are as follows:

MMTT 635 (Rubat Pushtba Dam, Esfahan), skull only, adult male;

MMTT 610 (5 km from Mobarrikieh, border of Kavir Protected Area, Tehran Province), skull only, adult male;

MMTT 631 (Kavir National Park, Tehran Province), skin and skull, adult female (holotype);

MMTT no number (Touran National Park), mounted skin, adult male;

BM 21.7.11. 5 (Kerman), skull only, adult male;

BM no number (Darab, near Neyriz), skull only, adult

female;

USNM 329355 (northwest of Deh Kuh, Fars, 27.53 N, 54.22 E), skin and skull, adult male.

There are also two skins without any closer locality than "Persia" which probably belong to this subspecies in the Natural History Museum, London, BM 39.822 and 39.823; they were obtained from the London Zoo where they had been presented by B.T. Finch, a British diplomat in Tehran in the 1930s. I have seen this subspecies alive in the Bahram-e Gour Protected Area, 250 km east of Shiraz; in the Touran Biosphere Reserve, northeastern Semnan Province; and in the Kavir National Park, 100 km southeast of Tehran.

Etymology: For Mr Jaffar Shikari, chief Game Guard of the Bahram-e Gour Protected Area, where I first saw this subspecies alive. For many years, Mr Shikari has mounted a successful conservation program in the face of appalling odds; his brother and his son, also Game Guards, have both been killed by poachers. It is a pleasure to associate his name with this beautiful animal. Jaffar Shikari is representative of the network of dedicated, knowledgeable and effective Game Guards, who have helped to keep Iran's natural heritage alive over the past decade and a half of external and internal threats.

Notes: Harrington [6] appears to have been the first to distinguish this subspecies from the previous one; if he indeed had this race in mind, then it must be noted that his account contains some errors, not least in calling the present form *fuscifrons*, a name which without doubt applies to the southeastern subspecies. He illustrates this race, which he calls the Jebeer Gazelle, as duller, more grey-fawn than the previous, the "Chinkara Gazelle", which is depicted as brighter, yellower, a not entirely accurate depiction; and he incorrectly states that the "Chinkara" has the more widely spreading horns. He correctly, however, notes the "Jebeer's" larger size, and the "Chinkara's" relatively large horns and dark face with black nose-spot. *Jebeer* is in fact the Farsi name for this species as a whole, distinguishing it from *G. subgutturosa* (known as *Ahu*).

The distribution as given by Harrington [6] is simply "Central desert hills... arid parts of central and southern Iran". As may be seen from the list of specimens and their localities above, *G. b. shikarii* n.subsp. in fact extends northwest into Tehran Province and northeast into the eastern part of Semnan Province, while it is replaced in the coastal strip and in Sistan by *G. b. fuscifrons* which extends as far west as the vicinity of Hormud and as far north as Qayen. As noted above (under *G. b. fuscifrons*), a

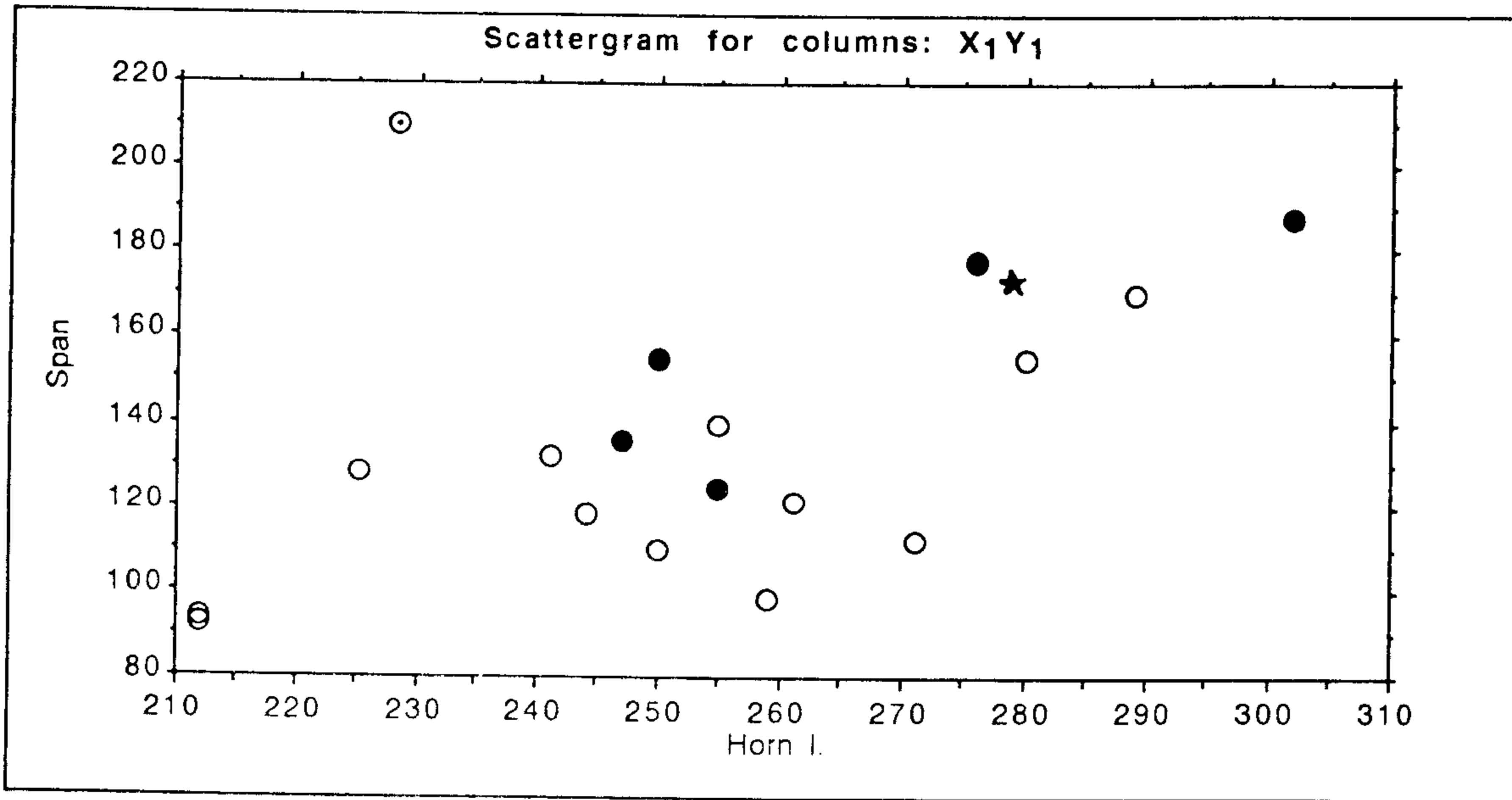


Figure 1a. Graph of horn span against horn length: Males (Open circles, *G.b. fuscifrons*; closed circles, *G.b. shikarii*; dot enclosed by circle, *G.b. karamii*; star, type of *kennioni*)

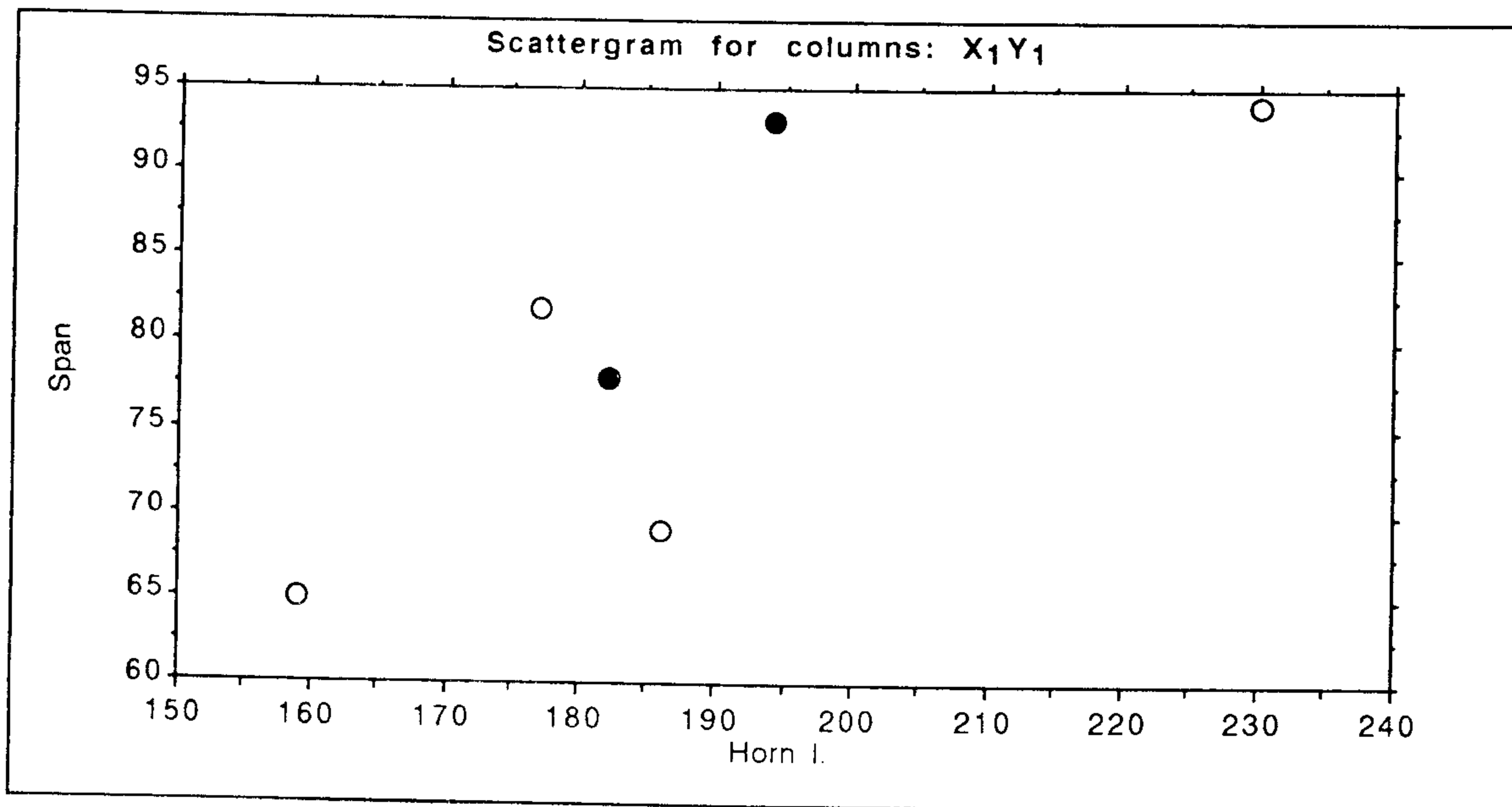


Figure 1b. Graph of horn span against horn length: Females

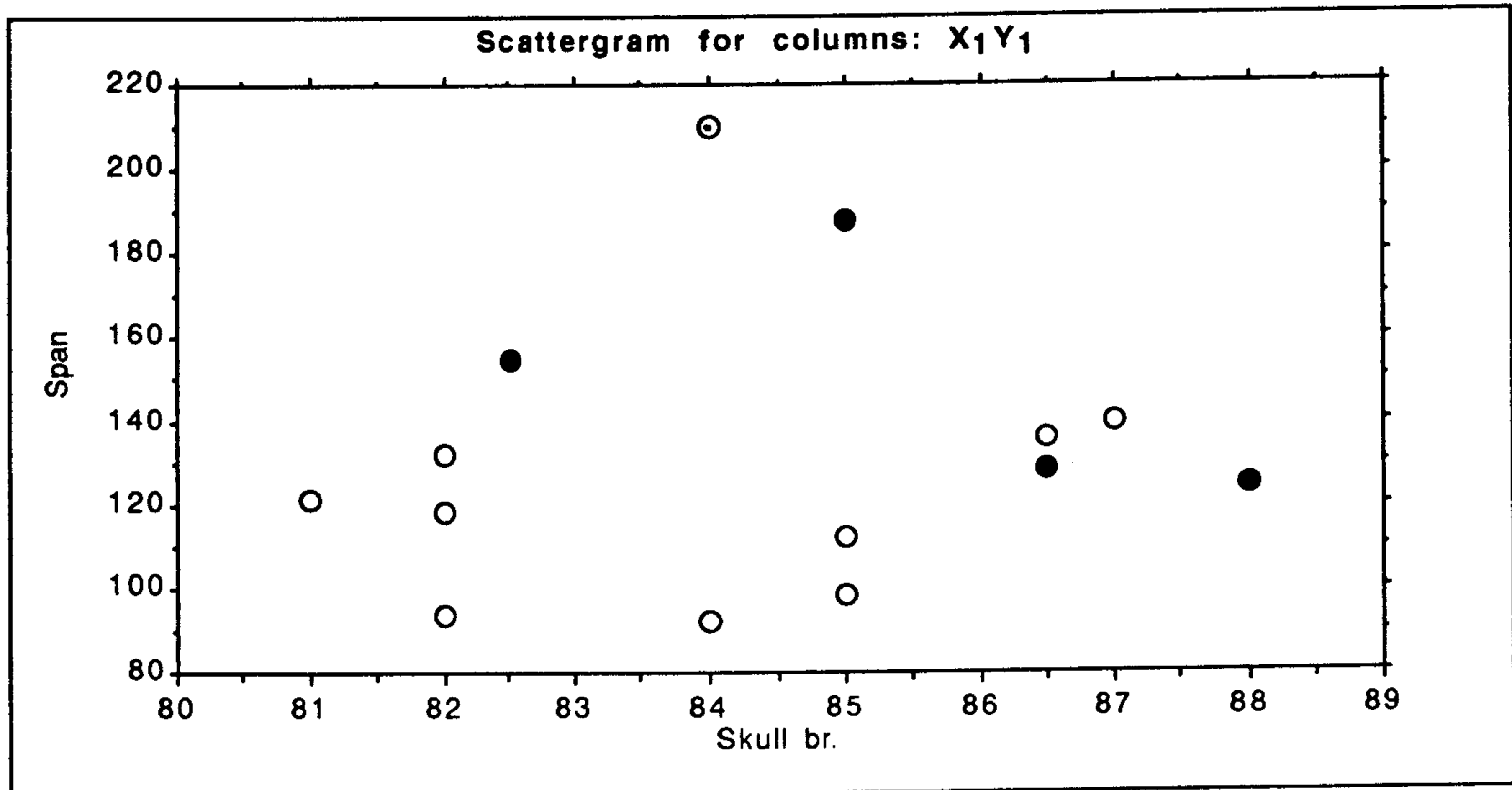


Figure 2a. Graph of horn span against skull breadth: Males (Symbols as for Fig. 1)

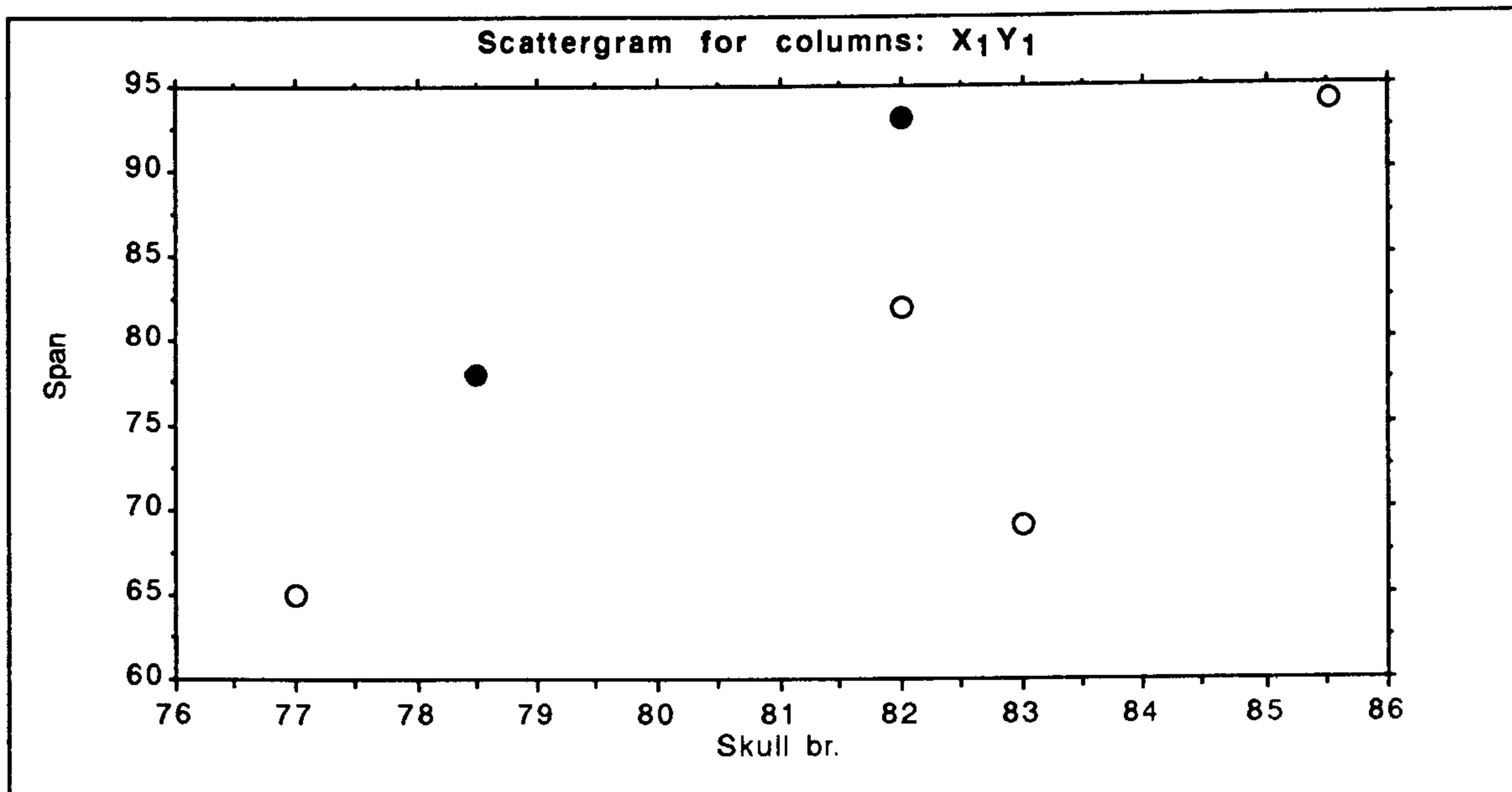


Figure 2b. Graph of horn span against skull breadth: Females (Smbols as for Fig. 1)

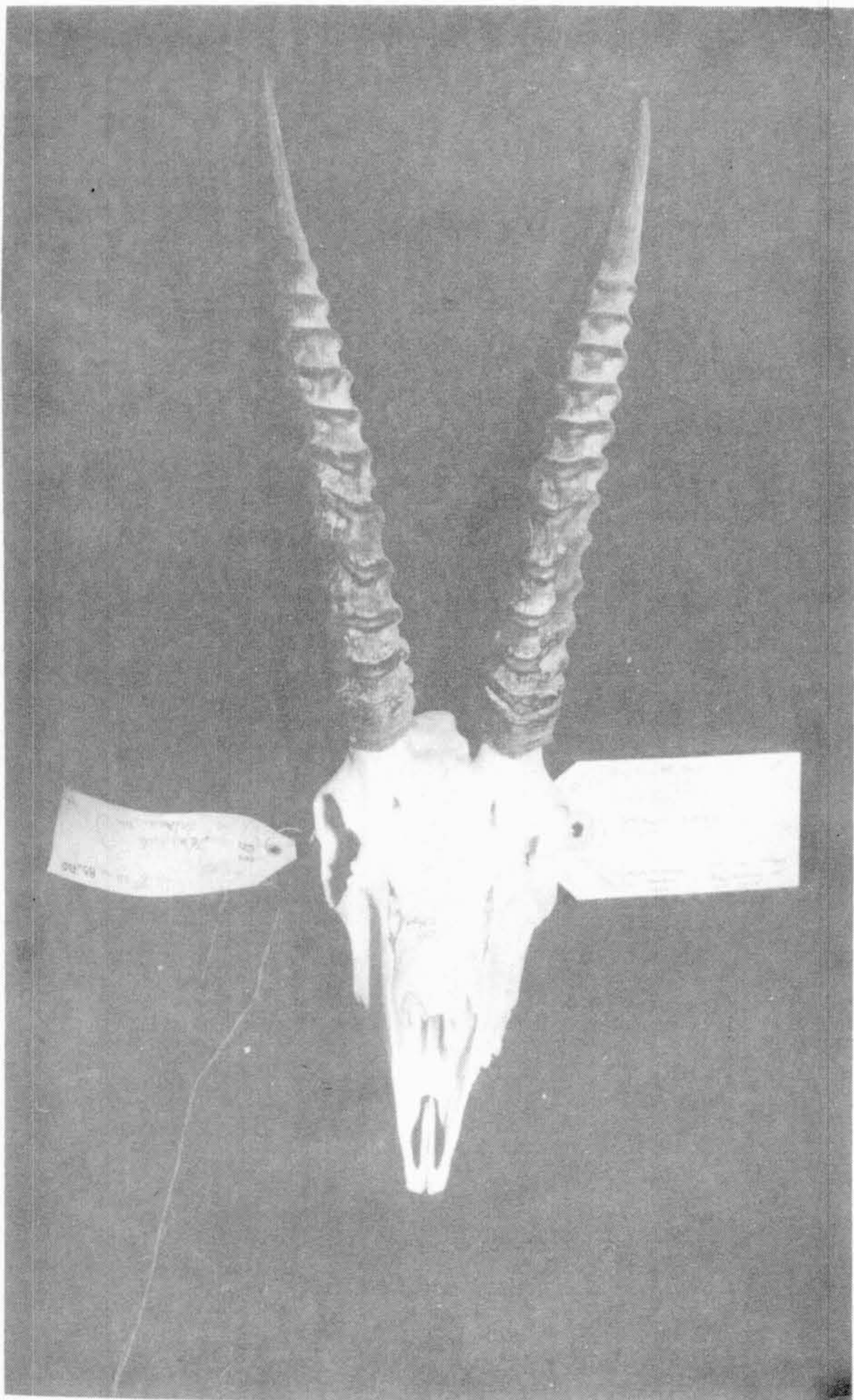


Figure 3a. Skulls of males of *G.b. fuscifrons* (BM 85.760, from Mekran): front view

specimen from Qayen has the widely spreading horns, slightly inturned at the tips, which are more usual in the new subspecies; in turn, the mounted skin from Touran shows a more marked nose-spot than usual. It is possible, therefore, that intergradation takes place in the region between Qayen and Touran.

It seems likely that in the past this subspecies was mostly confused by zoologists (though not by Game Guards!) with *Gazella subgutturosa*, which is much the same colour; even to the extent that the specimen here nominated as the holotype, clearly a female, was mislabelled as male (females of *G. subgutturosa* being generally hornless).

Gazella bennetti karamii n.subsp.

1873 *Gazella bennetti* Blanford, Proc. Zool. Soc. Lond., 318. Bushire (Bushehr).

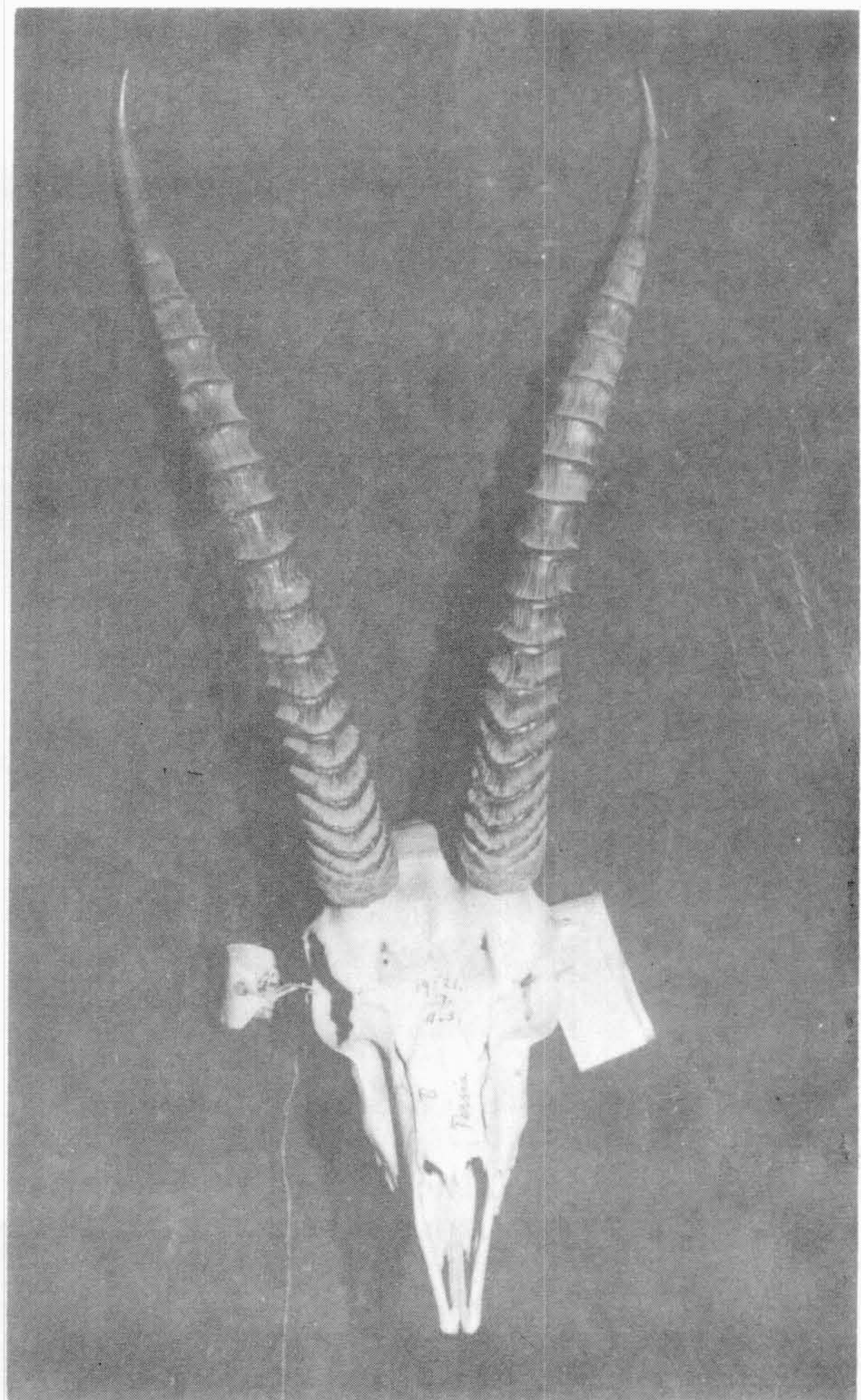


Figure 3b. Skulls of males of *G.b. shikarii* (BM 21.7.11.5, from Kerman): front view

Type: ZMB 41400 from east of Borazjan, near Bushehr, 29.15 N, 51.14 E) skull only, adult male.

Diagnosis: Distinguished from *G. b. shikarii* n.subsp. and *G. b. fuscifrons* mainly by its very small size; it also has exceptionally widely spread horns (Figs. 1a, 2a), with outturned tips; the toothrows are very widely bowed (Fig. 6a), and the facial region is very broad.

Etymology: For Dr. Mahmoud Karami (of the College of Natural Resources, Karaj), one of Iran's leading wildlife ecologists, who first brought me to Iran and convinced me of the special nature and significance of its wildlife.

Notes: This new subspecies is known from a single skull, but this is so different that there can be no doubt of its distinctness. According to Mr. Bijan Dareshuri (personal communication), it forms a small isolated population restricted to the Bushehr district.

In size, it rivals *Gazella saudiya* for the status of the

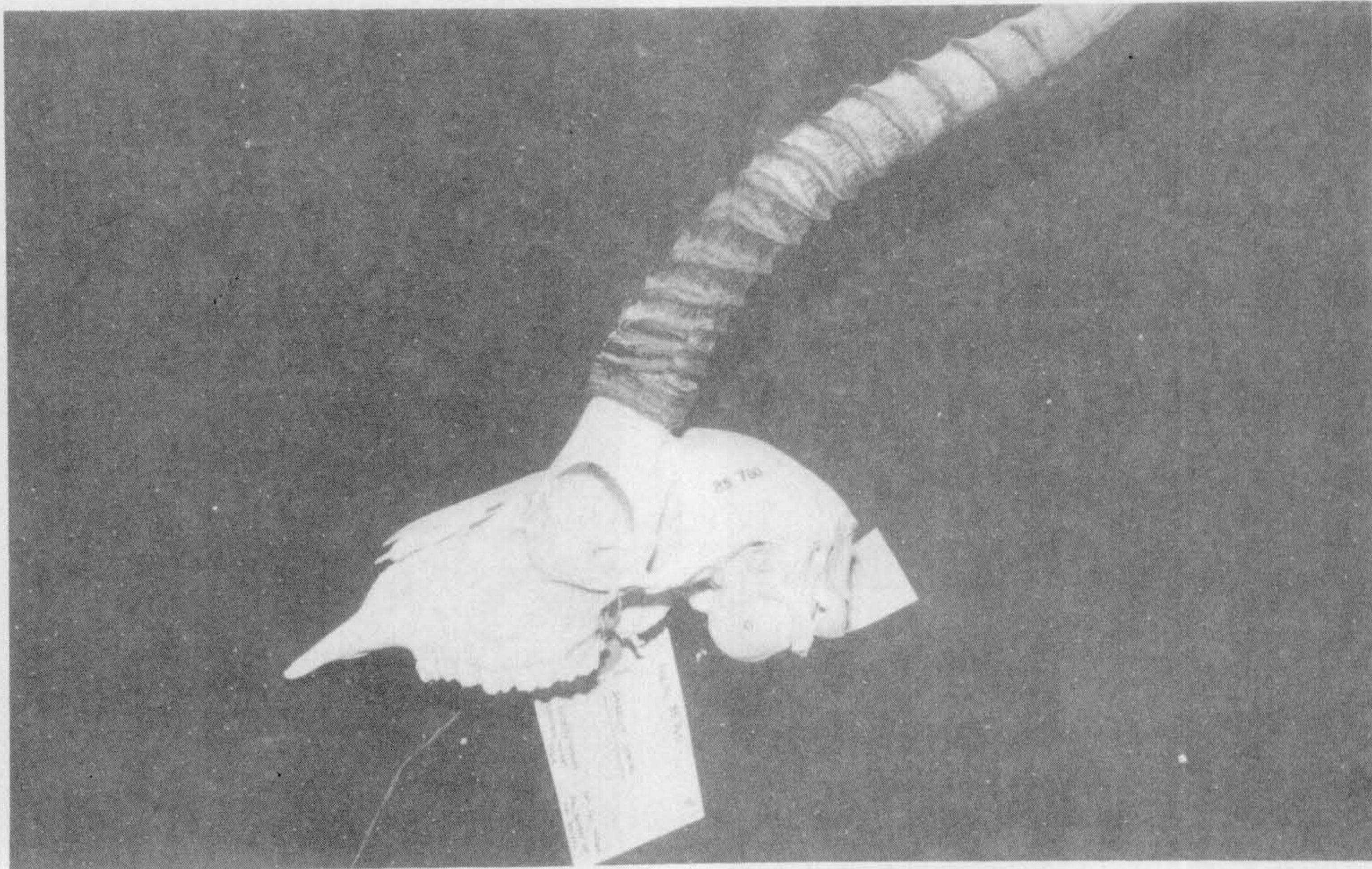


Figure 4a. Same as Fig. 3a, in lateral view

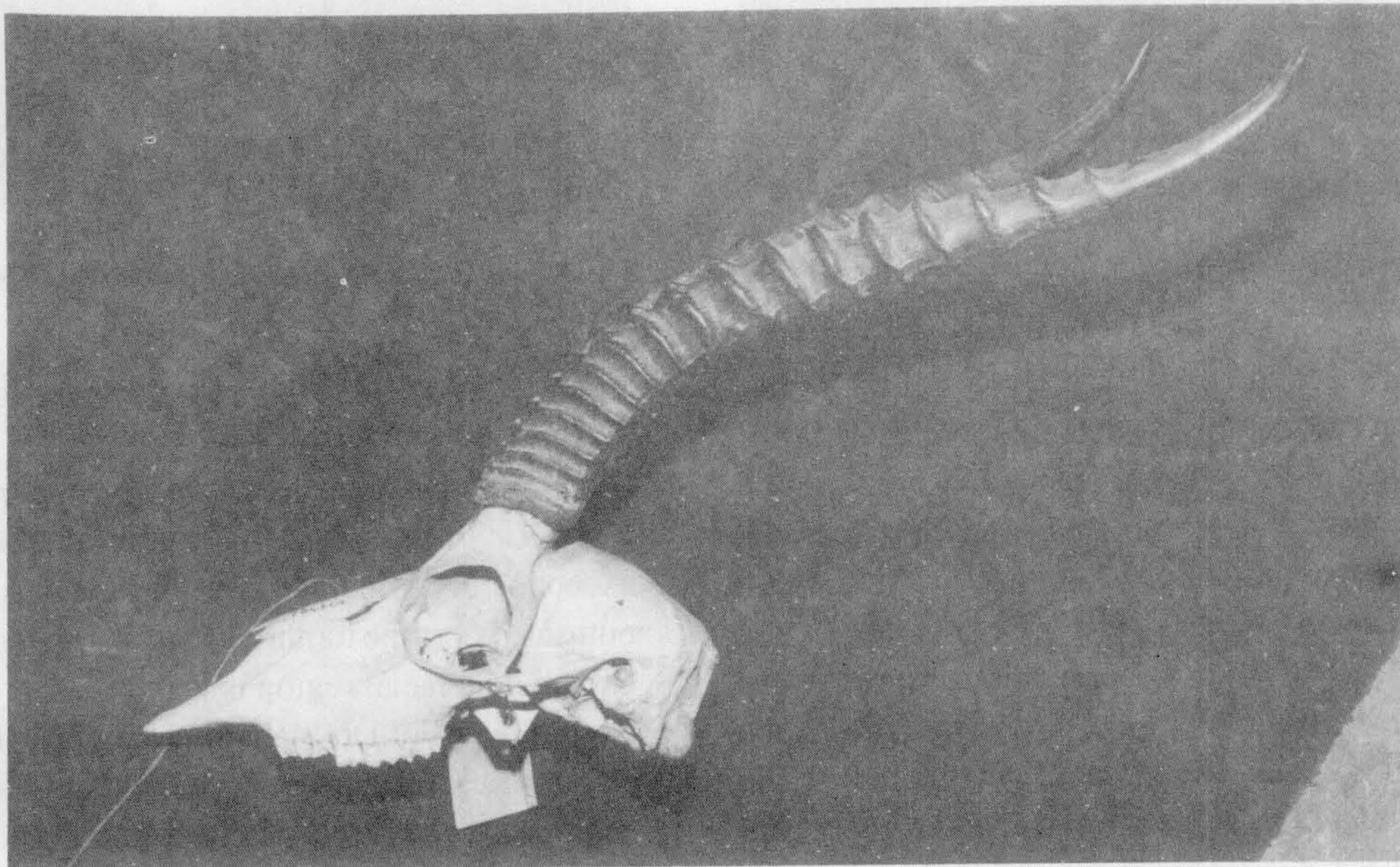


Figure 4b. Same as fig. 3b, in lateral view

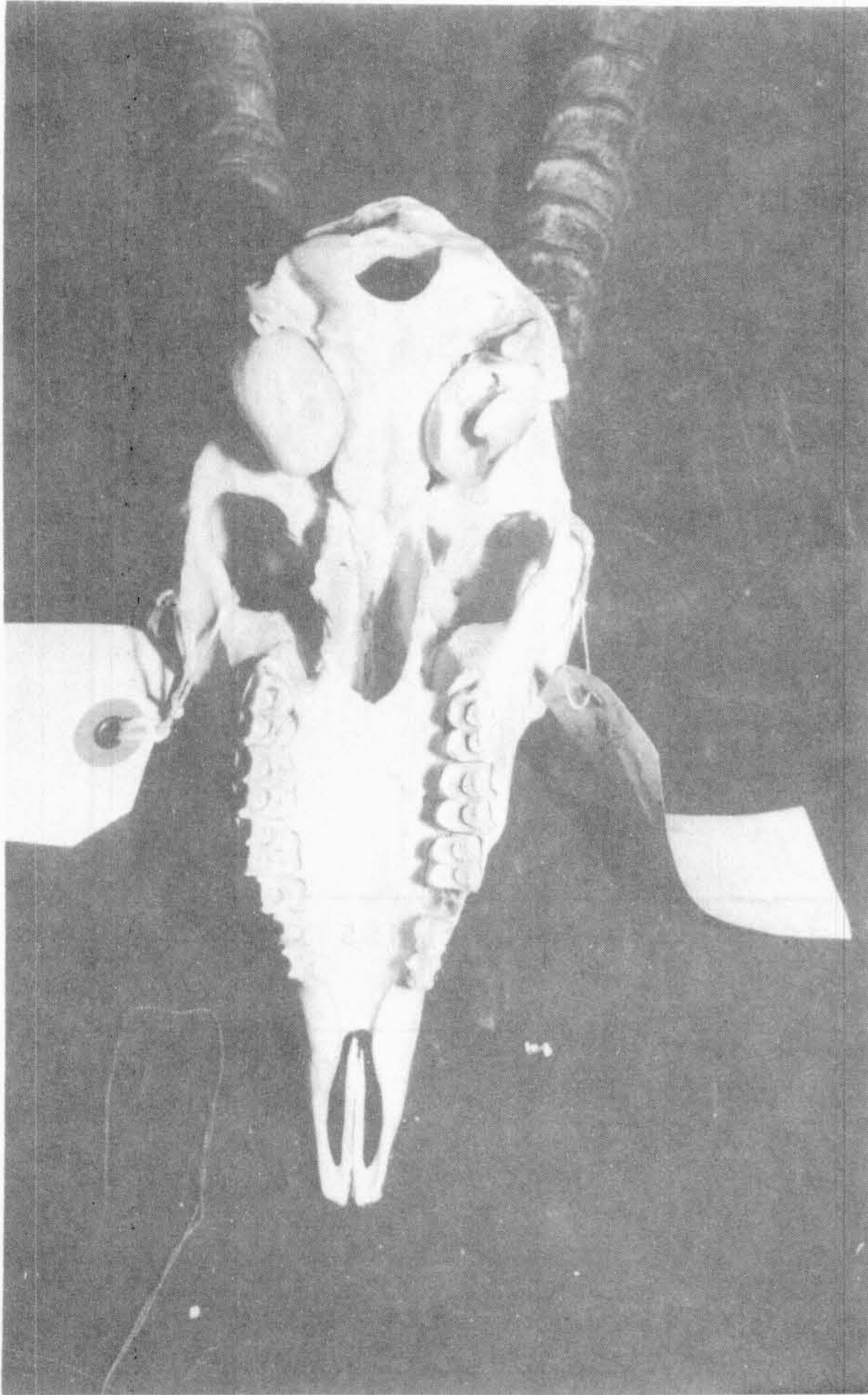


Figure 5a. Same as Figs. 3a and 4a, in basal view

smallest-sized member of the genus. As Furley *et al.* [4] have suggested that the latter might be closer to *G. bennetti* than to *G. dorcas*, to which it has normally been allied, Table 2 sets out the measurements of the type skull of *G. b. karamii* alongside those of *G. saudiya*. It can be seen that, for a skull whose Greatest Length measurement is virtually identical to the mean for *G. saudiya*, *G. b. karamii* has shorter, much more widely spread horns, much broader nasal bones which do not narrow posteriorly, larger teeth and a much broader facial region. In general, these features reflect the characters of *G. bennetti* generally, although the facial breadth is excessive and the horn spread is unique.

Discriminant Analysis

Figure 9 shows the results of a Discriminant Analysis between males of *G. b. fuscifrons* and *G. b. shikarii*. The seven *fuscifrons* and three *shikarii* crania are clearly

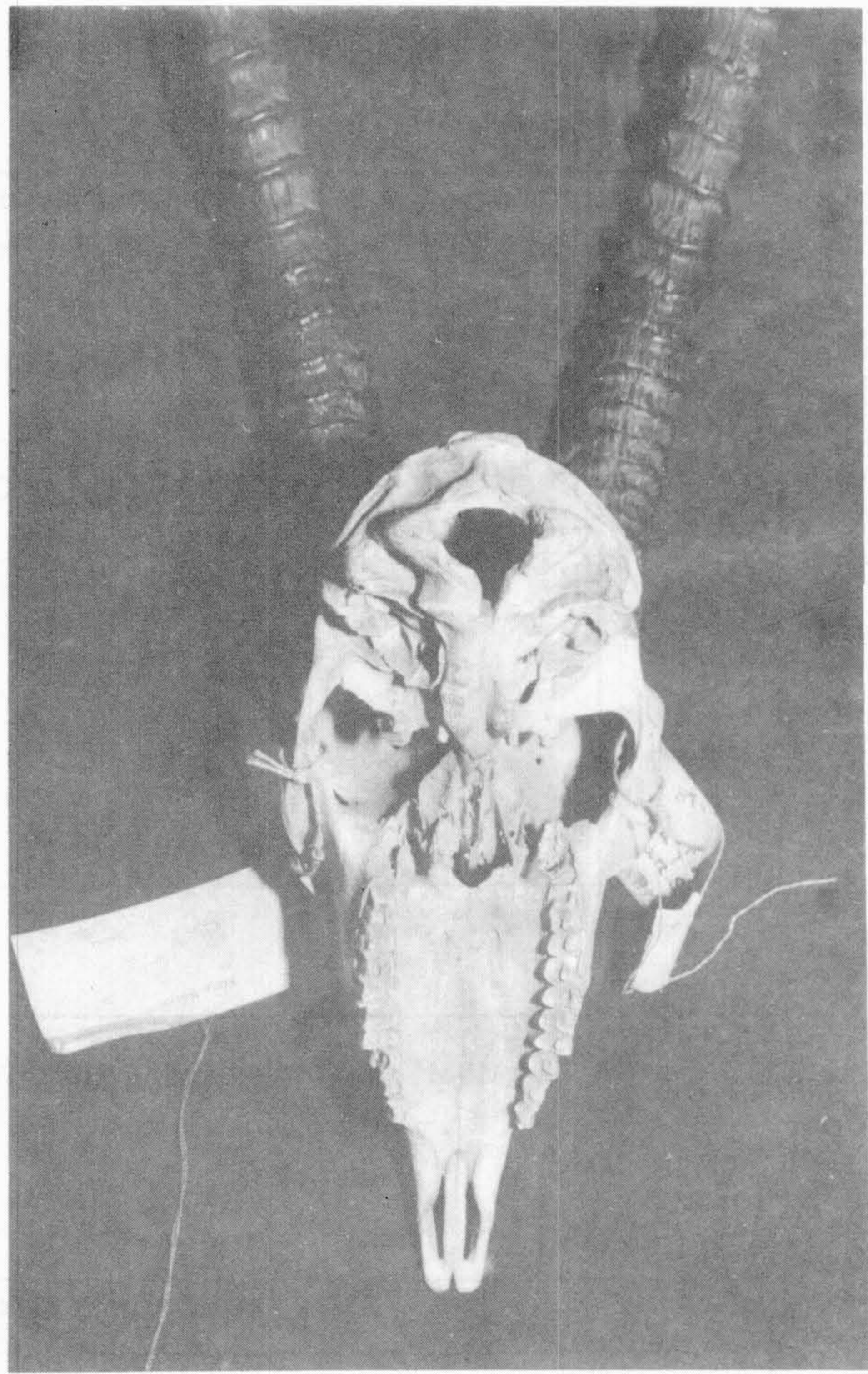


Figure 5b. Same as Figs. 3b and 4b, in basal view

separated; the single skull of *G. b. karamii*, entered as an unknown, falls in with *fuscifrons*. Palate Breadth, Greatest Skull Breadth and Greatest Skull Length contributed especially strongly to the discrimination. There are insufficient females of *G. b. shikarii* to perform a Discriminant Analysis.

Figure 10 puts males of Iranian *G. bennetti* in the context of the species as a whole. In Figure 10a, based on the full data set, *G. b. fuscifrons* from Iran and Pakistan (group 1) stands alone, though very close to skulls from Rajasthan (group 8); while *G. b. shikarii* (group 2) also stands alone, well apart from *G. b. fuscifrons* and closest to skulls from Panjab. In Figure 10b, based on a reduced data set to maximise sample sizes, *G. b. fuscifrons* from Iran and Sind falls mainly in among the skulls from Rajasthan, but overlapping with those from Uttar Pradesh (no. 9); it has been mentioned above that Rajasthani specimens are probably to be included in *G. b. fuscifrons*.

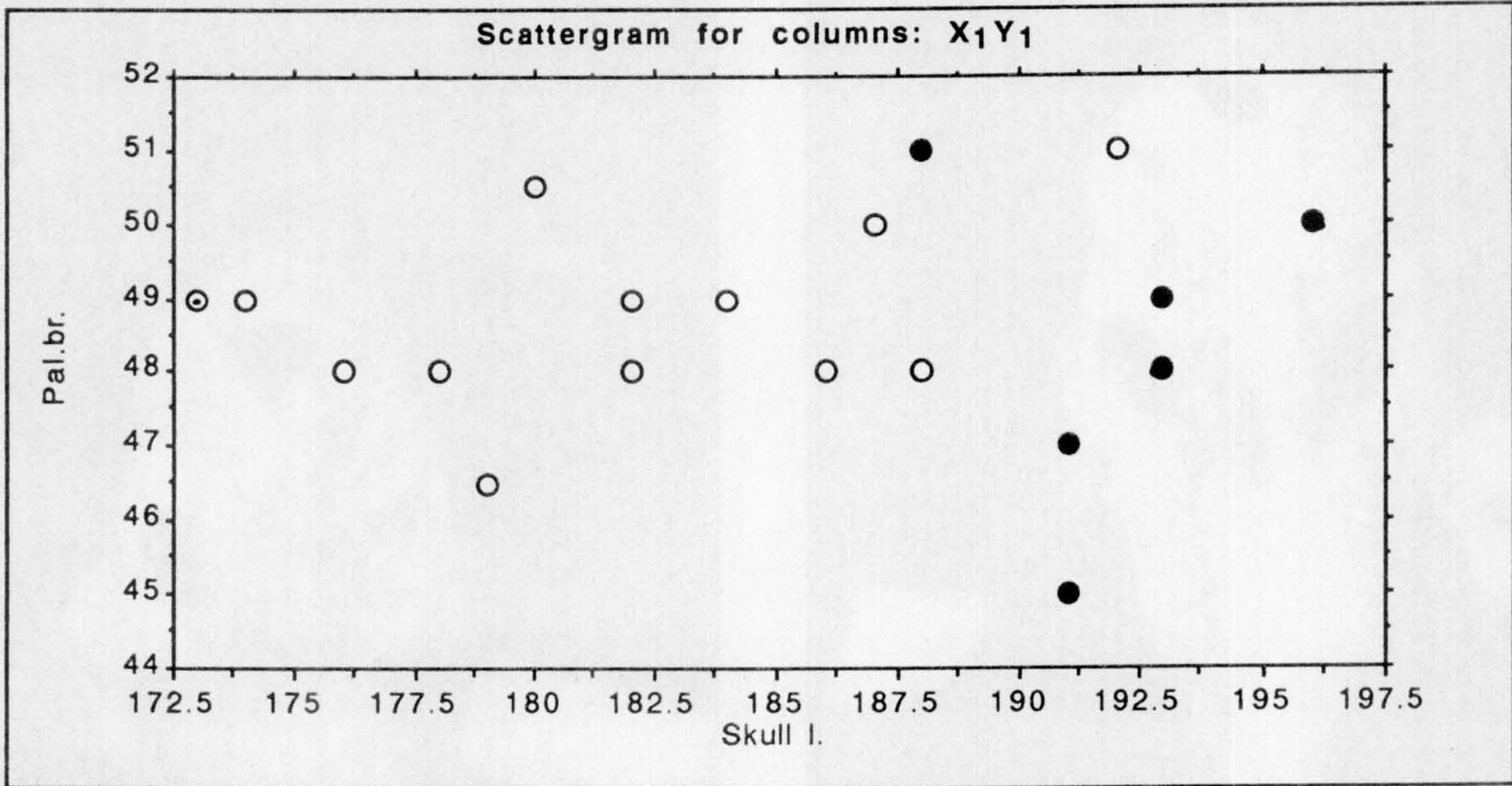


Figure 6. Graph of M¹-M¹ width against skull length (Symbols as for Fig. 1)

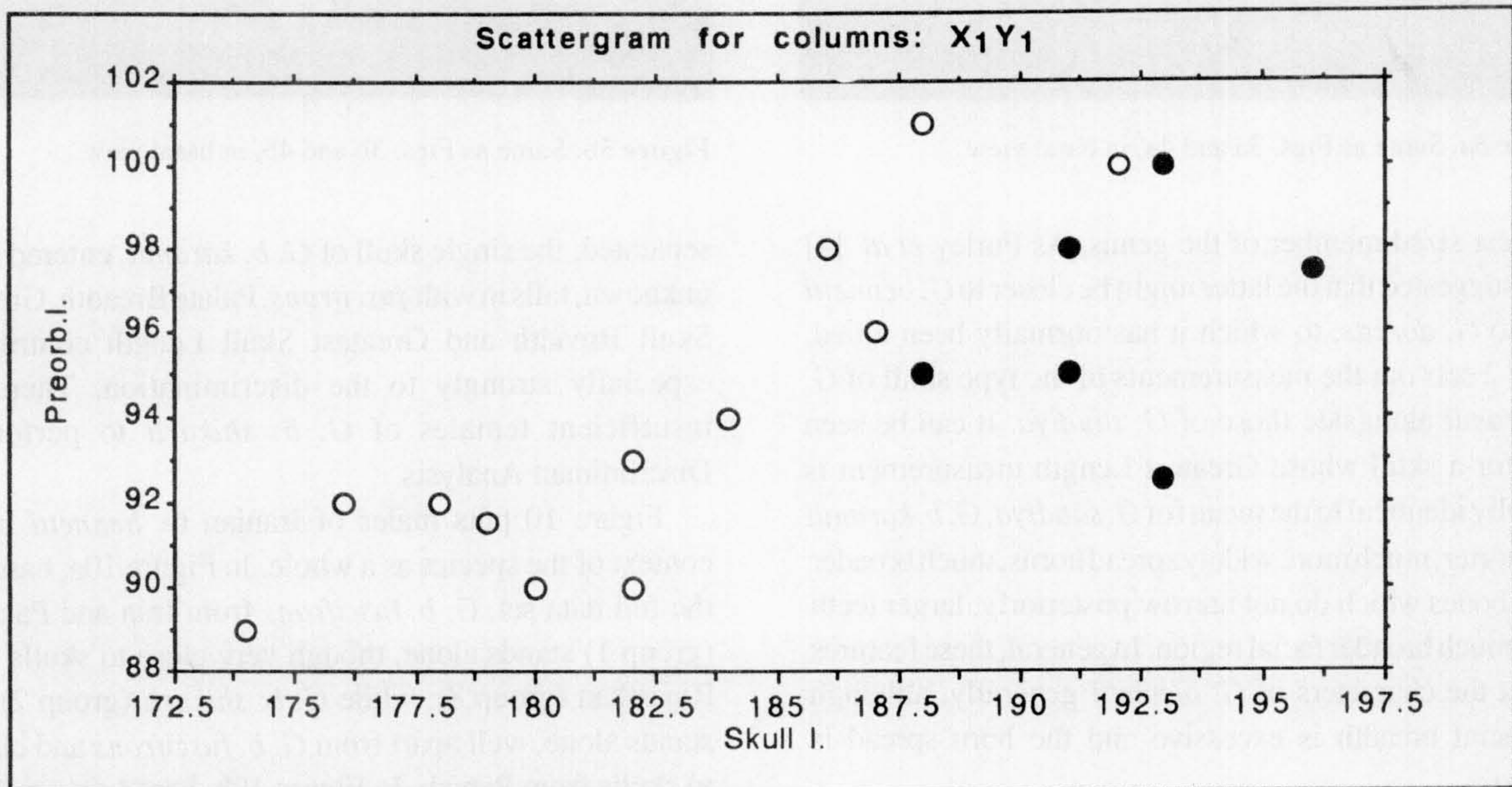


Figure 7. Graph of preorbital length against skull length (Symbols as for Fig. 1)

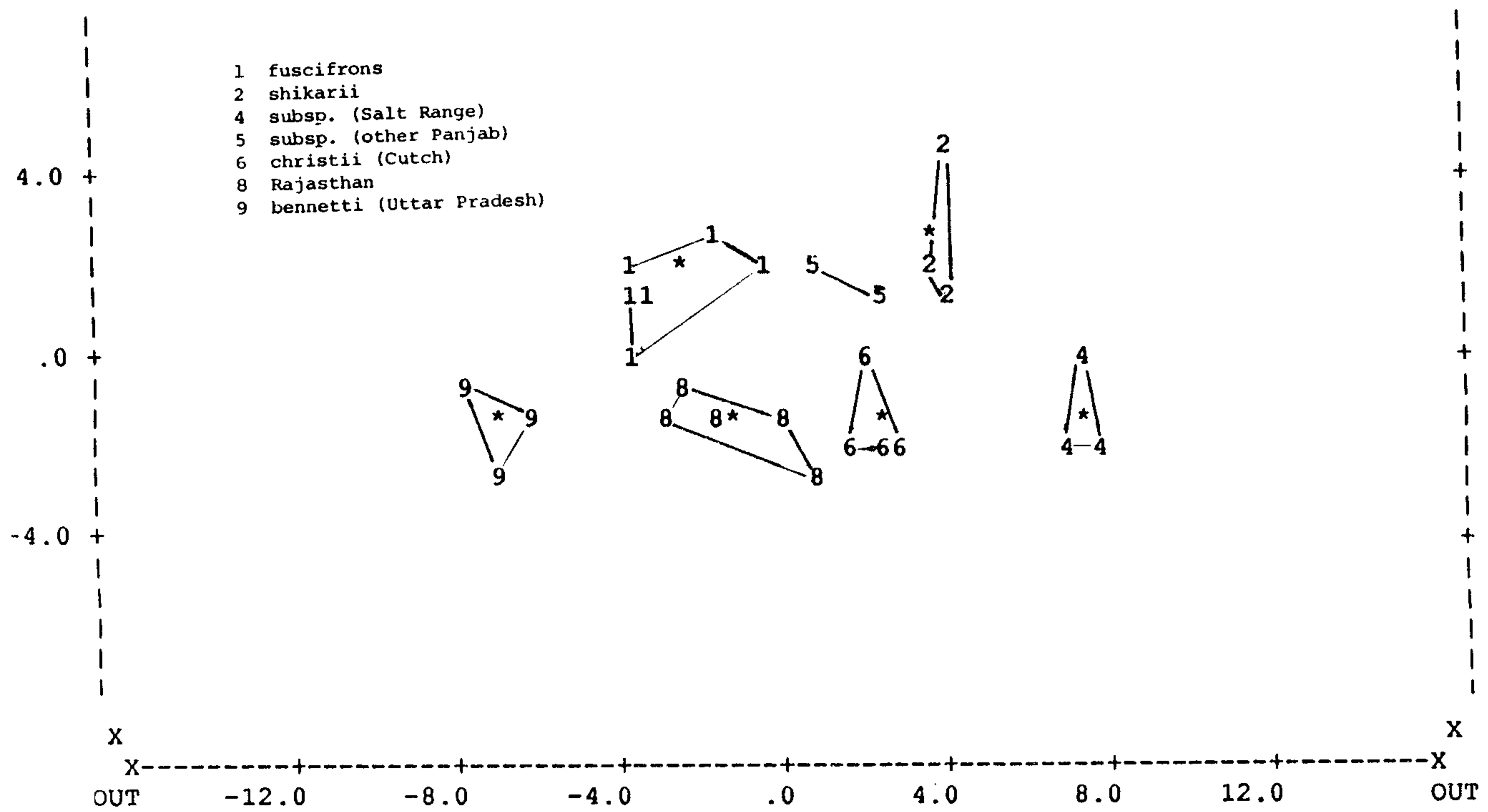


Figure 10a. Graph of first Discriminant Function for skulls of males of *G. bennetti* from all over its range (Iran, Pakistan, India), to locate Iranian subspecies within the context of the species as a whole

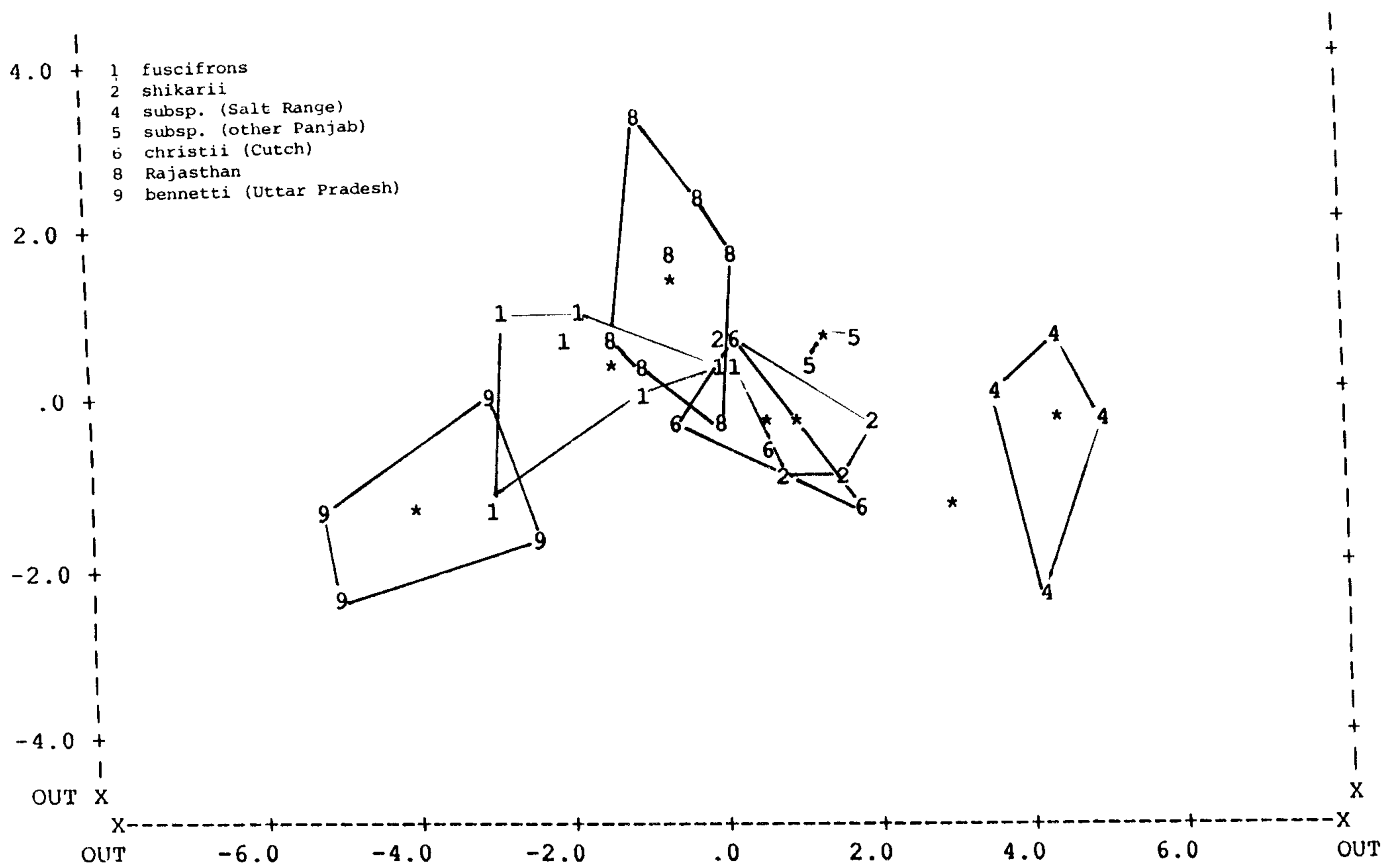


Figure 10b. Graph of second Discriminant Function for skulls of males of *G. bennetti*

Table 1. Skull measurements of *G. b. fuscifrons* and *shikarii*

	<i>G. b. fuscifrons</i>			<i>G. b. shikarii</i>		
	Mean	s.d.	n	Mean	s.d.	n
a. Males						
Horn length	247.2	23.9	11	266.0	23.1	5
Horn span	119.5	22.8	11	156.2	27.1	5
Tip-to-tip	103.5	28.8	11	141.3	31.5	5
Bases ¹	62.1	4.59	10	63.8	2.99	4
Nasals ant. ²	23.7	2.37	8	23.3	1.04	3
Nasals post. ³	24.0	1.22	8	24.7	2.08	3
Nasal length	51.3	4.62	8	53.7	3.21	3
Max. skull length	184.4	4.47	7	192.5	3.32	4
Max. skull width ⁴	83.8	2.18	9	85.5	2.35	4
Preorbital 1.	94.1	3.64	8	96.3	3.23	4
Toothrow 1.	56.9	1.27	9	57.0	3.65	4
M ¹ - M ¹ width	48.9	1.27	9	49.5	1.29	4
Braincase br. ⁵	60.4	2.87	7	64.1	2.78	4
Braincase 1. ⁶	97.2	4.04	8	105.1	3.75	4
b. Females						
	Mean	s.d.	n	MMTT 631	BM no no.	
Horn length	175.4	38.4	5	194	182	
Horn span	77.5	13.2	4	93	78	
Tip-to-tip	54.5	12.6	4	77	57	
Bases ¹	52.4	2.92	7	53	53	
Nasals ant. ²	21.5	1.87	6	22	-	
Nasals post. ³	22.8	1.72	6	22	21*	
Nasal length	47.3	5.54	6	60	-	
Max. skull length	179.4	5.37	5	191	191*	
Max. skull width ⁴	80.9	3.20	6	82	78.5	
Preorbital 1.	92.7	4.79	5	98	95*	
Toothrow 1.	55.7	2.06	7	57	53*	
M ¹ - M ¹ width	48.3	1.22	7	47	45*	
Braincase br. ⁵	59.2	1.52	7	62	-	
Braincase 1. ⁶	94.4	3.42	7	98	104	

¹Breadth across bases of horn cores

²Width across anterior end of combined nasal bones

³Width across posterior end of combined nasal bones

⁴Width taken across lower margins of orbits

⁵Width across supramastoid crests

⁶Fronto-nasal suture to opisthocranion

* estimated

Note that the horn measurements of *G. b. fuscifrons* males have been calculated including the type of *G. hayi* but not that of *G. yarkandensis kennioni*, which as explained above possibly tends towards *G. b. shikarii*.

Table 2. Skull measurements of *G. b. karamii* and *G. saudiya* (males)

	<i>G.b.karamii</i>	<i>G.saudiya</i>		n
		Mean	s.d.	
Horn length	228	268.8	18.35	6
Horn span	210	115.0	21.19	6
Tip-to-tip	190	101.8	24.29	6
Breadth across bases	58	56.3	2.14	7
Nasal width anterior	21	18.6	0.98	7
Nasal width posterior	22	17.6	0.79	7
Nasal length	41	42.4	3.89	8
Greatest skull length	173	172.8	3.06	6
Greatest skull width	84	77.8	1.68	7
Toothrow length	56	52.8	2.31	8
Palate breadth	49	44.6	1.27	7
Braincase breadth	58	57.5	1.60	8
Braincase length	98	97.6	3.15	7
Ant.: post. nasal br.	95.5	105.8	5.79	7

Skulls of *G. b. shikarii* this time fall in with those from Cutch (*G. b. christyi*, no. 6). It must be stressed that the first two Discriminant Functions do not exhaust the variation (they account for 87% and 88%, respectively), but it is noteworthy that these two Iranian subspecies do not form a group with respect to the Indian ones. A full revision of the subspecies of *Gazella bennetti* will be undertaken in a subsequent paper.

Acknowledgements

I am very grateful to the curators whose assistance facilitated my study of gazelle skulls for this study: Mr. John Edwards Hill, Ms. Daphne Hills (who kindly supplied photographs of key specimens for me) and Ms. Paula Jenkins (BM), Dr. Hank Setzer (USNM), Dr. Philip Hershkovitz (FMC), Dr. Renate Angermann (ZMB), Dr. Chris Smeenk (RML) and in particular Mr. Etemadi (MMTT), whose discussions on gazelles were most fruitful. I am most grateful to the Iranian biologists, especially Dr. Mahmoud Karami, Mr. Bijan Dareshuri, Mr. Alamish and Mr. Moinian, and Game Guards, especially Mr. Jaffar Shikari of Bahram-e Gour and Mr. Amir Ahani of Touran, who enabled me to see gazelles in the field and so ultimately to revise their taxonomy.

References

1. Bentham, T. *An illustrated catalogue of the Asiatic horns and antlers in the collection of the Indian Museum*. Calcutta. (1908).
2. Blanford, W. T. (a) Note on the gazelles of India and Persia, with description of a new species. *Proc. Zool. Soc. Lond.*, 313-9. (1873). (b) *The fauna of British India, including Ceylon and Burma: Mammalia*. London. (1891).
3. Ellerman, J. R. and Morrison-Scott, T. C. S. *Checklist of Palaearctic and Indian mammals, 1758 - 1947*. London. (1951).
4. Furley, C. H., Tichy, H. and Uerpmann, H.P. Systematics and chromosomes of the Indian gazelle, *Gazella bennetti* (Sykes, 1831). *Z. f. Säugetierkunde*, **53**, 48-54. (1988).
5. Groves, C. P. (a) On the smaller gazelles of the genus *Gazelle* de Blainville, 1816. *Ibid*, **34**, 38-60. (1969). (b) An introduction to the gazelles. *Chinkara*, **1**, **1**, 4-10.
6. Harrington, F. A. *A guide to the mammals of Iran*. Tehran. (1977).
7. Lydekker, R. (a) The gazelles of Seistan. *The Field*, **111**, 499. (1908). (b) An African rhinoceros, klipspringer, and gazelle. *Proc. Zool. Soc. Lond.* 958 - 962. (1911). And Blaine, G. (c) *Catalogue of ungulate mammals in the British Museum (Natural History)*. Vol. 3. London. (1914).