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Some craniological observations on the Iranian, Transcaspian, Mongolian and Indian hemiones

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Introduction

With a geographical range from Mongolia to Syria, it is no wonder that the variation of hemiones (Asiatic wild asses) be very great. If we assume that the small Syrian and the large Mongolian forms belong to the same species (*Equus hemionus*), the intraspecific range of variation is about double that what may be found in a species of Zebra, for example *E. grevyi*. But when the sizes are similar, are there other differences, and of what scope, between the various populations or subspecies of hemiones? What is the general taxonomical structure of the hemiones?

The question is not purely academic; it has a very practical aspect. For example, a captive breeding programme must take care of twice as many individuals if Transcaspian and Iranian hemiones are different. Most zoologists, ethologists and biologists see no difference either in skin colours and patterns (Zimmermann, pers. comm.) or in behaviour (Neumann-Denzau, pers. comm.). But another view was expressed by Groves and Mazak (1967), who described the subspecies *E. hemionus kulan* (Transcaspia) as distinct from *E. hemionus onager* (Iran).

The European Endangered Species Programme (EEP) has decided to address both the general problem of the taxonomy of hemiones as a whole, and the practical issue of a possible difference between Transcaspian and Iranian forms, by instigating the formation of an *E. hemionus* Global Management Plan Working Group. The taxonomy of hemiones and the comparison of kulans and onagers is currently the object of an interdisciplinary review, assembling zoologists, biologists, ethologists and geneticists in the same programme. Dr. Waltraut Zimmermann, on behalf of the Equid Taxon Advisory Group asked one of us (VE) to contribute by extending her research on the osteological similarities and differences of the two forms. The Cologne Zoo provided funding enabling VE to visit various zoological collections containing skulls and skeletons of these hemiones, in addition to those she had already visited previously. In course of the programme, it appeared that Dr. Nita Shah (NS) had collected a very good sample of Indian hemione skulls, nearly absent in other museums or institutions. A preliminary account of the new craniological data is the object of this paper. A complementary account by Dr. Arnd Schreiber and Waltraut Zimmermann, including preliminary results of genetic analyses, will appear in parallel in this volume.

Problems and materials

From the osteologist point of view, hemiones are the most frustrating group of extant horses. Although their range is far wider than that of any other wild equid, their skeletons and skulls are certainly not the most abundant nor the best known. Usually they may be found in very old osteological collections and belong to very old zoo individuals showing all the stigmas of senescence and captive life. When the remains have been collected in the field, they are usually limited to often broken skulls and may actually prove to belong not to a hemione but to a kind of pony or donkey. The skull mentioned by Stubbe and Chotochlu (1968, p. 103) is that of an *E. caballus*, as well as the skulls labelled "*Kiang nepalensis trumler*" in the British Museum collection (never trust a label!). Together with a beautiful sample of skulls of khurs (Indian hemiones), NS has collected several skulls of donkeys in the Rann of Kutch. These errors are perfectly natural. They are also easy to mend when the reference material is good enough. But the main difficulty is to find good reference material.

In a comprehensive revision of hemiones, Groves and Mazak (1967) have proposed to distinguish the Transcaspian *E. hemionus kulan* from the Iranian *E. hemionus onager*. On the skulls, they noted that the occiput is wider in the Iranian form than in the Transcaspian form. As they were able to use only about 15 skulls of the first and six skulls of the last, the craniological part of their work could benefit from some expansion. Nearly 30 years later,

we have a larger sample size at our disposal: 25 skulls and 30 skulls respectively. In addition, the present material includes 25 skulls of *E. hemionus khur* (India) and 28 of *E. hemionus* (Mongolia). The skulls belong to the zoological collections of Lyon and Paris (France), Berlin, Bonn, Hamburg, Kiel and Munich (Germany), London (Great Britain), Amsterdam and Leiden (the Netherlands), Moscow, St. Petersburg and Tbilisi (ex-Soviet Union), Basel and Geneve (Switzerland) and Chicago, New Haven, New York and Washington (United States of America). Most Indian skulls were collected by NS in the Little Rann of Kutch. One Iranian skull was collected and measured by Marjan Mashkour at Kharturan. Four skulls were measured by Gertrud Neumann-Denzau in the South Gobi. Many thanks are due to Claus Pohle for his help in tracing specimens sent from zoos to museums after their death.

Preliminary results

Basilar lengths overlap in all hemiones but the skulls are certainly larger in the Mongolian form. The basilar lengths are on the whole similar in the Iranian, Transcaspian and Indian hemiones; the range of variation is larger in the Iranian form.

The occipital widths overlap also in all hemiones. However, scatter diagrammes combining basilar lengths and occipital widths show some differences in the mutual overlapping:

- The Indian sample is nearly entirely included in the Iranian. The regression lines are rather similar (fig. 1)
- The overlap is smaller between Iranian and Transcaspian forms (fig. 2). Although the two samples cannot be differentiated, the regression lines are rather different. As already noted by Groves and Mazak (1967), the occiput tends to be wider in Iranian hemiones.
- The overlap is smallest between Transcaspian and Mongolian forms (fig. 3) because Mongolian skull are larger overall. But the regression lines are not as different as between onagers and kulans.

Thus, in relation to the size of the skull, Transcaspian and Mongolian (i.e. northern) forms have narrower supra-occipital crests than Iranian and Indian (i.e. southern) forms. Since the supra-occipital crest is the area of insertion of the ligaments suspending the skull, it may be that the difference is not trivial. Could it be related to a particular way of carrying the head? Anyway, and whatever the interpretation of this particular characteristic, the Iranian form seems closer to the Indian than to the Transcaspian form.

An important feature of equid craniometry is the distance of the posterior border of the palate to the posterior border of the vomer. It is relatively long in some very old equids (Forsten & Eisenmann, 1995) and is believed to be a primitive characteristic. Practically, it provides an easy discrimination between asses ("primitive") and horses ("derived"). The histogramme for this measurement in Iranian hemiones shows a variation different from the other three forms (fig. 4).

Discussion

The Iranian hemiones have a particularly great range of variation, both in the basilar length and in the palate-vomer distance. On some diagrammes, a few skulls seem to stand apart, including one specimen from London, one from Lyon, and four from Amsterdam. The simplest explanation would be that different geographical forms have been imported by different collectors, and that the six skulls above have a common origin. Thanks to the studbook data and Waltraut Zimmermann's enquiries on the origin of the Hagenbeck stock, this hypothesis could be partly investigated. Unfortunately, we do not know the origin of the London specimen; it is a Rothschild bequest which entered the British Museum collection in April 1918, through the Zoological Society of London (ex-Tring). The Lyon skull comes from Northern Iran. The Amsterdam skulls belong to the offspring of one "family" of Hagenbeck stock (studbook ## 25, 49, 102 and 114). The animals collected by Hagenbeck are all said to have originated from a "salt pan in central Iran" (Schreiber and Zimmermann, this volume). Thus the "cluster" tentatively defined above associates one skull of Northern Iran with four skulls from Central Iran and one of unknown origin.

Moreover, the three minimal values of the palate-vomer distance were observed in one "family" of Hagenbeck stock (studbook ## 120, 223 and 264), and the two maximal values in another (studbook ## 25 and 102).

Aside from the Hagenbeck stock, only five or six skulls have known origins: Kharturan (measured in the field

by Marjan Mashkour), Sharhud Bastam (Lyon 383), Damghan near Samnan (Chicago 97880), 50 km SE Garmab/Dasht-e-Kavir (Washington 327091) and Kuh Hashimabad/NE Kachan (Geneve 876-20 and possibly 876-21). All of them come from areas north of Hagenbeck's collection place, and three are also more western. No special clustering of these skulls can be observed.

The evidence is therefore not consistent with a geographical explanation of the variation inside the Iranian hemiones.

Conclusion

We do not know whether the differences in the occipital width observed between the Iranian and the Transcaspian forms can be explained by a genetic drift during the last 100 or 200 years of separation between the Transcaspian and Iranian populations, or if these "subspecies" have a more ancient origin. In spite of their phenotype and biological similarities, our preliminary impression is however that, yes, there are differences between Transcaspian and Iranian hemiones.

Morever, it seems that Iranian hemiones, by their peculiar variability in one basicranial feature, occupy an unusual position among all hemiones, and possibly all extant equids.

Much more work will be necessary to refine these impressions.

References

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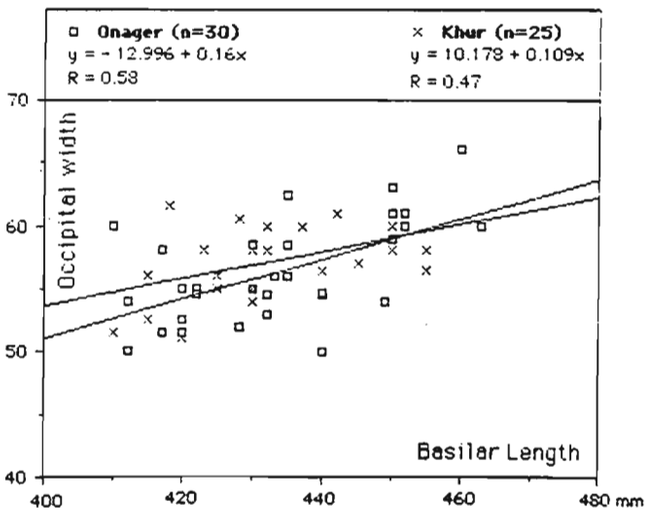
Groves, C.P. and V. Mazak. 1967 . On some taxonomic problems of Asiatic wild asses; with the description of a new subspecies (Perissodactyla; Equidae). Z. f. Säugetierkunde 32 (6): 321-355.

Stubbe, M. and N. Chotochlu. 1968 . Zur Säugetierfauna der Mongolei. Perissodactyla. Mitteilungen Zool. Mus. Berlin 44 (1): 101-104.

Figures

Figures 1-3. Scatter diagrammes and regression lines of the occipital width on the basilar length in hemiones from Iran (onagers), India (khurs), Transcaspian (kulans), and Mongolia (dziggetais). R: coefficient of correlation.
Figure 4. Histogrammes of distances between the posterior border of the palate and the posterior border of the vomer in Iranian, Transcaspian, Mongolian and Indian hemiones.

Fig.1 Occipital width vs. basilar length in onager and khur



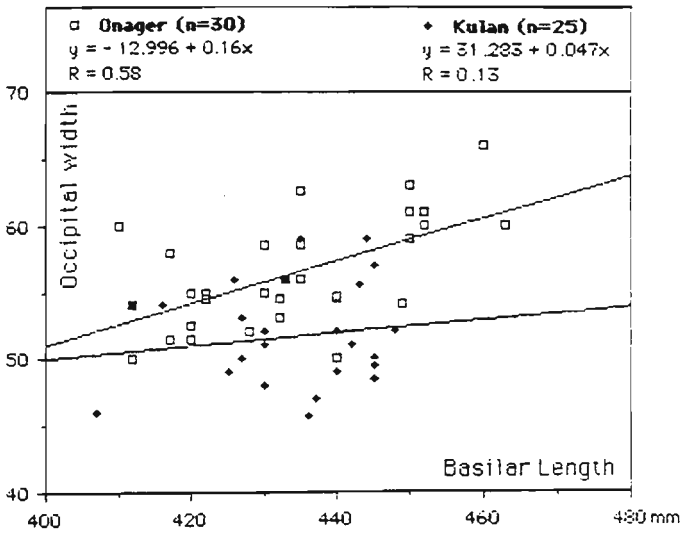


Fig.2 Occipital width vs. basilar length in onager and kulan

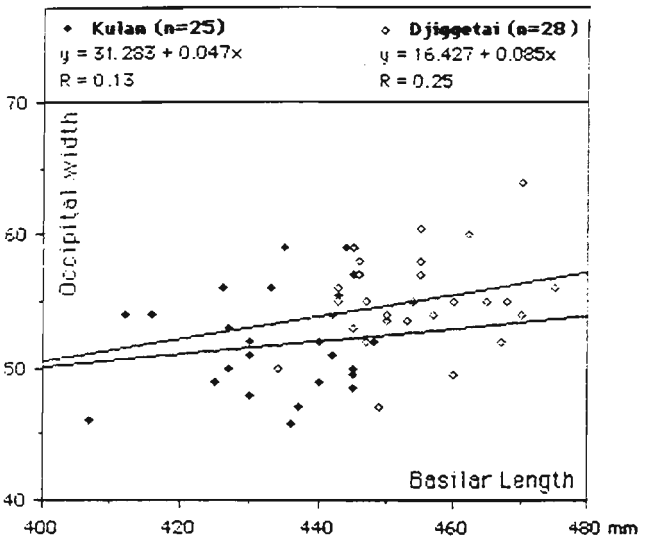
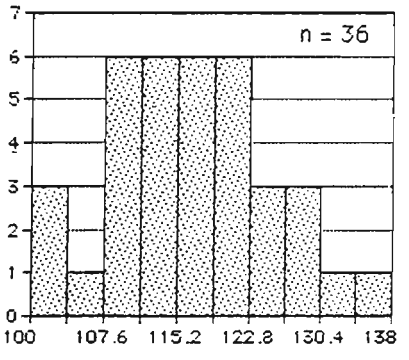
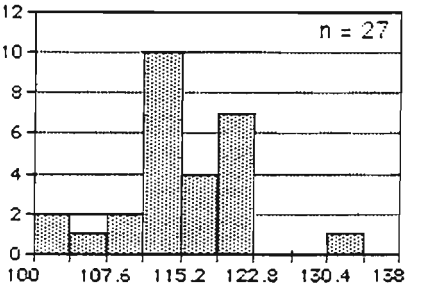


Fig.3 Occipital width vs. basilar length in kulan and dziggetai

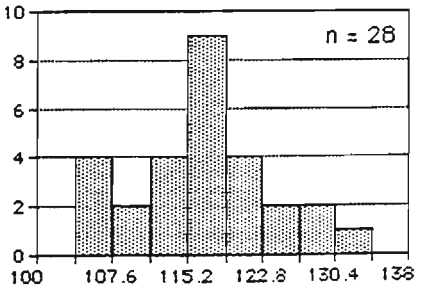
Fig.4 Histogrammes of distances between palate and vomer posterior borders



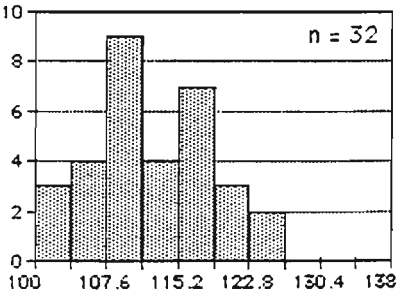
Equus hemionus onager



Equus hemionus kulan



Equus hemionus hemionus



Equus hemionus khur