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correct, but the opposite statements, with which they respectively conflict, are grossly incorrect. Klapproth adopted the erroneous version in every instance; M. Dutreuil de Rhins has done so in the two last instances, but he has happily avoided the first and most egregious error which Mr. Robert Gordon, as well as Klapproth, found so captivating. D'Anville very wisely stops his rivers when they enter *terra incognita*; thus he does not commit himself to either of the three erroneous versions of Tibetan hydrography.

On the Length of the Persian Farsakh.

By General A. HOUTUM-SCHINDLER, Persian Telegraph Service.

THE cubit was the unit of all the measures of length in Asia,* and is so now in Persia. The Persian cubit was the same as the Babylonian one, and was no doubt adopted in prehistoric times. The Nuzhet el Kulûb (geographical work by Hamdullah Mustofi, about 1340), speaking of the Farsakh,† says that its length was determined by Kai Kobâd, the first of the Kaianians ("the farsakh was fixed at 12,000 cubits"). We may therefore assume that the Babylonian cubit was introduced into Persia at the same time or before. But Kai Kobâd, although by some writers considered to be the Dejokes of the Greeks, is a more or less mythical personage.‡ Dejokes flourished about 700 B.C. From measurements on Babylonian ruins, Oppert found that the old Babylonian cubit was equal to 525–530 mm. (20·670 to 20·867 inches). There is on the knees of the statue of the Chaldean King Gudea (about 2600 B.C.), found some years ago by de Sarzec at Tel-loh, a plan of a fortress, and from its scale, the length of the cubit then in use was found to be equal to 540 mm. (21·260 inches), and finally from measurements on the palace of Sargon (721–705 B.C.), at the foot of the Muzri hill, the length of the cubit was found to be equal to 548·5 mm. (21·595 inches).§ There were two kinds of cubits, the *common* and the *royal*, and the latter was three digits longer.¶ As the royal cubit had a length of 24 digits, the common cubit was equal to 21 digits, or $\frac{7}{8}$ of a royal cubit. The Greeks calculated the parasang at 10,800 cubits, the Persians at 12,000; the cubits therefore must have been different, for we have instances of different cubits, but there is nothing to show that there were different Farsakhs. It is certain that the Greeks adopted the royal Babylonian cubit of 525 mm. This is proved from the Greek foot, which had a length of about $\frac{3}{5}$ of the Babylonian cubit, varying from 308 to 315 mm. (12·126 to 12·402 inches).¶¶

* Brandis, 'Münz-, Mass- und Gewichtswesen,' p. 22.

† *Farsakh* is the Arabicised form of the word *pârsang*, explained in dictionaries as pieces of stone placed on the roadside at distances of a farsakh; *pârsang* was transcribed by the Greeks as *παρασάγγης*.

‡ Spiegel, 'Eranische Alterthumskunde,' i. 724–730.

§ Oppert, 'Records of the Past,' vii. 53; xi. 22.

¶ Herod., i. 178.

¶¶ The length of the Greek foot varied from 308 to 315 mm. The Attic (Olympic) foot at the time of Perikles had 308 mm. (12·126 inches), from the temples at Selinus the Greek foot was found to be 310 mm. (12·205 inches), from those at Pæstum 314 mm.

It is also certain that 10,800 of these cubits made one parasang, 5670 metres or 3·523 Eng. stat. miles. When we consider that the Persians had probably long before the Greeks adopted the cubit and the parasang from the Babylonians, and that the common cubit was $\frac{2}{3}$ of the royal cubit, and when we find that the twelve-thousandth part of a parasang equals 472·5 mm. (18·605 inches), and is exactly $\frac{2}{3}$ of the old royal cubit of Tel-loh (540 mm.), we may, I think, without going far wrong, conclude that the Persians had adopted the old *common* Babylonian cubit of 472·5 mm. It is only in this way that the Greek and Persian itinerary measures can be made to correspond, and that they did correspond is, I think, certain. The parasang of 5670 m., or 3·523 miles, was therefore the one used by the Persians, the Greeks, and the early Arab geographers, and the stadium of Herodotus, $\frac{3}{10}$ of a parasang, had therefore 189 m. or 620·09 feet.

Many writers calculated the farsakh from the Olympic stadium of 606·315 feet and made it 3·445 miles (5544 m.); but the parasang or farsakh was an old Babylonian measure and was based on the Babylonian cubit, and the stadium of Herodotus should therefore, I think, be calculated from the parasang and not the parasang from the stadia, which were later on used in Greece; and, from what I said above, I can only come to the conclusion that the parasang of 30. stadia or 10,800 cubits, was equal to 5670 m. or 3·523 miles. Later on different cubits came to be introduced in Persia, and with them the length of the parasang varied.

The cubit now in use in Persia varies between 520 and 530 mm. (20·473 and 20·867 inches), and as 12,000 go to the farsakh, the farsakh would vary from 6240 to 6360 metres, or 3·877 to 3·952 miles, giving a mean value of 6300 metres, or 3·915 miles. From this I conclude that the Persians finally adopted the royal Babylonian cubit of 525 mm., for $12,000 \times 525 \text{ mm.} = 6300 \text{ metres}$, or 3·915 miles as before.

The cubit is in Persia called by the Persian name *gez*, meaning originally the measuring stick, and by the Arabic *dhará'* (Hebrew *dará'*). *Dhará'* stands for "the arm from the elbow to the tip of the middle finger;" it is the royal cubit, *πῆχυς βασιλῆως* of Herodotus (i. 178) and was three digits longer than the common cubit. *Dhar'* in Arabic means "measuring with a cubit;" the Persians for "measuring" used the expressions *dhar* (pronounced *zar*) *Kerdan* and *gez Kerdan*. The *gez* now in use is generally understood to be two cubits, and is the same as the old *gez i Sháhigán* (royal yard), half the height of a man of ordinary stature, now also called *gez i sháh*; but in many parts of Persia the *gez* is understood to be only a cubit. The double *gez* is generally called *zar* (*dhar'*), and is equal to 1040 to 1060 mm. (40·946 to 41·734 inches), double the Babylonian cubit of 525 mm. The 'Nuzhet el Kúlúb' speaks of the 24 digit *dhará'* as a *dhará' i Khalkí* (popular, common, cubit?) and distinguishes it from the *gez i Khayáti* (the tailor's measure), which was 32 digits or $1\frac{1}{3}$ *dhará'*. The *gez* and *dhará'* are equivalent to a *gám* or *Kadam i Khalkí* or *Kadam i ushter i hamvár* (pace, common pace, ordinary pace of a camel) (Burhám i Káta' and Ferhang).

The 'Nuzhet el Kúlúb' relates that in Málek Sháh's time (1073 to 1092) a

(12·302 inches), and from the Heraeon at Samos 315 mm. (12·402 inches). (Brandis, p. 21, note 4.) The stadium had 600 feet, hence taking the different values of the foot we get for the stadium 184·8 m. or 606·315 feet (this is the Olympic stadium), 186 m. or 610·25 feet, 188·4 m. or 618·2 feet, and 189 m. or 620·9 feet. A further proof that the Greeks adopted the Babylonian cubit of 525 mm. is that the Samian foot coincided with the Babylonian foot, and that the Samian cubit was, according to Herodotus (ii. 168), equal to the Egyptian cubit, and the latter measured 525 mm. (Brandis, p. 21, note 3.)

number of different farsakhs were in use in Persia. The Khârezm farsakh was one o 15,000 paces, the Azerbâijân and Armenian farsakhs equalled 18,000 paces, the farsakh of Kurdistân, Luristân, Khûrzistân, Fârs, Shebân-Kâreh, Diârbekr, &c., had only 6000 paces, and Râm (Syria), Gurjistân (Georgia), Arran, Môghân, Shîrvân had no itinerary measure at all, but calculated distances by time and stages. Mâlek Shâh therefore defined the farsakh as a distance of 6000 paces. It is not said what was the length of one of these paces. The old Persian pace was equal to three feet of 14 digits (Vendidad, Darmesteter, iii. 17), i. e. $1\frac{1}{2}$ royal cubits or 918·75 mm. This farsakh may therefore have been equal to 5512·5 metres or 3·425 miles. Uljaitû Khân (1303-1316; the author of the 'Nuzhet el Kûlûb' was his secretary) placed pillars, *mîl* (our milestones) on the roads, and during his time most farsakhs were equal to 8000 gez i Khayâtî, and as the author elsewhere says that the *true* farsakh equalled 9000 gez i Khayâtî, Uljaitû's farsakh must have been $\frac{1}{9}$ shorter. This farsakh of Uljaitû was, I think, the same as the one known as Mamûn's farsakh, and the same which is used and called at present the Farsakh i 'Arab (Arabic farsakh), 3·125 miles nearly. The author himself uses throughout the farsakh of 12,000 old dharâ', that is one of 5670 m. or 3·523 miles.

It is impossible to calculate the length of any measure from any Arab measurements of a terrestrial degree, for the instruments of the Arab astronomers were not accurate enough, otherwise it would be easy to divide the known length of a degree by the number of farsakhs contained in it. The old geographers, following Ptolemy, assumed 25 farsakhs equal to one degree; most Arab geographers, basing their calculations on the measurements of a terrestrial degree made under the Caliph Mamûn, accepted 22 $\frac{2}{3}$ farsakhs as equal to one degree and others held 18 $\frac{2}{3}$ to be the right number. Mamûn's farsakh is the one at present known as the *farsakh i 'arab* and is used in the Arabian provinces (Arabistân) of Persia, while the farsakh in use on the Persian plateau is the *farsakh i 'ajam*, 3·915 miles. From actual measurements I obtained for the former 3·125 miles, for the latter 3·82 miles.* With the Babylonians the parasang was the distance which a robust pedestrian could walk in an hour (and the sun, like the pedestrian, did every hour a distance of thirty stadia, or one parasang on the equator), and this too is the popular opinion in modern Persia. A farsakh, an hour's walk, an hour's distance are synonymous. Hence, the *popular* farsakh in mountainous districts is generally shorter than in plains. The farsakh in the plains of Khorâsân is proverbially long; "as long as the intestines of 'Omar," says the pious Shîa'h. The farsakh was also defined by a man's sight. "A parasang is a measure as much as a far-seeing man may look out, see a beast of burden and make known that it is black and white;" † also by sound, as in Luristân, where a farsakh "is the distance to which the sound of a drum reaches." Sometimes distance and time seem to be synonymous; in Khorâsân one frequently hears that the distance to a place is so many farsakhs for a horse and half as many for a man on foot; for instance, "from Nishâpûr to Kadamgâ, is six farsakhs for a pedestrian and four farsakhs for a man on horseback" (actual distance is about 15 miles). From a Kurd I heard a very peculiar definition of a farsakh; according to him, whenever he found that his shoestrings required tying up he had walked a farsakh.

The smallest Persian measure of length is the *mû*, hair; generally hair of a

* These figures I obtained by dividing the distances of many stages, as roughly measured by myself in miles, by the number of farsakhs in the stages. The latter I took from geographical works.

† Bî ndahish, West, xxvi. 1.

mule is understood; seven are said to equal (the breadth of) a barleycorn. The *Jô*, barleycorn, broadwise, is the sixth part of an *angusht*, a digit. In old English measure* three barleycorns, round and dry, placed end to end lengthwise, were equal to one inch, while in the 16th century the breadth of four barleycorns made a digit. Four digits make a *musht*, palm, in Arabic *Ḳabzeh* (English measure 16th century, four digits = one palm), and 24 digits or six palms are one *gez* or *dharâ*, a cubit (English measure 6 palms = 1 ell). Intermediate measures are the *bahr*, a Persian word meaning part, portion, equal to the length of a thumbjoint or $1\frac{1}{2}$ digits, and the *gireh*, which equals two bahr or three digits. The cubit also equalled two spans. A span is called *wajeb*, and is the span between the thumb and the little finger. The Avesta mentions three different spans: 1. The *Vitasti*,† equal to 12 digits; that is, a span between the thumb and the little finger, and two of these were a cubit (royal?); 2. The *dishiti*,‡ equal to 10 digits, a span between the thumb and the forefinger. If these definitions are correct, the first span having been the longest, it seems that the little finger was formerly quite as long as the middle finger; while, with the present Persians, it is generally more than an inch shorter. There was also the foot, the *padha*,§ new Pers. *pâ*, having a length of 14 digits, that is nearly three-fifths of a cubit of 24 digits. This old Persian foot was probably the Babylonian foot (315 to 320 mm.), which also was three-fifths of the cubit. Three feet were one *gaya*,|| new Pers. *gâm*, step, a pace, the distance between the feet in walking (Burhân i K.). The word now generally used in Persia for a step is the Arabic *Ḳadam*; it is sometimes confounded with the *dharâ*. The space between the tip of the middle fingers when the arms are outstretched, also the height of a well-proportioned man, a fathom, is now called *baghal*; also *Ḳad*, Arabic for stature, height of a man; in the Avestâ it is *vibâzû*.

500 *dharâ*' are equal to one *amâj*. This is the length of a plough furrow, our furlong (one furrow long), and is the eighth of a *mîl*, mile, like our furlong; it is also defined as the distance an arrow flies, a bowshot.

Four *amâj* are one *nedâ*, explained in dictionaries as the distance a man's voice can reach.

Two *nedâ* equal a *mîl*, a mile (a *mîl* is a column, a pillar, a milestone), and three *mîl* make a *farsakh*.

The terms *amâj*, *nedâ*, are quite obsolete, *mîl* nearly so.

The *farsakh*, as we have seen above, equals 12,000 cubits, *dharâ* or *Ḳadam* i *Khalkî*, *gâm*, and *Ḳadam* i *ushtur* i *hamvâr*, and 9000 *gez* i *Khayâti*.

Some of the Arab geographers calculated distances in *mîl*, and as they used the *farsakh* of 5670 metres or 3·523 miles, the *mîl*, $\frac{1}{3}$ of a *farsakh*, equalled 1890 metres or 2066·96 yards (1·174 mile), about 120 feet more than an English nautical mile.

Another division of the *farsakh* was the *Kurôh*, and three *Kurôh* were equal to a *farsakh*, therefore same as a mile. Persian dictionaries, copying the 'Burhân i Kâta', add that the *Kurôh* was in Arabic called *Karâ*, but the author of the 'Ferhang i Anjuman Arâ' notes that he has not found the word in any book whatever. Another name for *farsakh* was *gâw* (lit. cow); this, according to dictionaries, equalled three *Kurôh* of 3000 or 4000 *gez* each. Hence a *gâw* was equal to 9000 to 12,000 *gez*, probably 9000 *gez* i *Khayâti* and 12,000 *dharâ*, like a *farsakh*. The terms *Kurôh* and *gâw* for measures of length have also become obsolete.

* Statute 17 of Edward II., 1324.

† Vendidad, viii. 76, 77; xvii. 5.

‡ Vend., xvii. 5.

§ Vend., ix. 8, 9, 11.

|| Vend., iii. 17.

The measures of length as *now* used in Persia are as follows :—

	Varies from		to		Mean Value.	
	inches.		inches.		inches.	millimetres.
1 angusht, digit	·853		·861		·857	21·875
1½ digits = 1 bahr	1·279		1·304		1·292	32·8
2 bahrs = 1 girch	2·559		2·608		2·584	65·6
4 digits = 1 musht, palm	3·412		3·444		3·428	87·5
6 palms = 1 dhará, gez	20·473		20·867		20·670	525
2 dhará' = 1 zar, double gez	40·946		41·734		41·340	1050

12,000 dhará', or 600 double gez = 1 farsakh = 3·915 miles, or 6300 metres. *

In conclusion, I must mention the popular but rather undetermined measure of length, the *maidán*, somewhat similar to the Greek *ἰππόδρομος*. This was originally a measure for horsemen, "as much as a horse could run at full speed without doing itself any harm." It is the charetu of the Avesta (Vend., ii. 25), and is defined by the commentary as being equal to two hathras (2 hazârs, 2000 big paces) that is ½ parasang.

GEOGRAPHICAL NOTES.

Progress of Mr. Joseph Thomson in Morocco.—By telegram dated July 28th our enterprising young African explorer informs us that he had returned to the city of Morocco after two successful incursions into and across the Atlas, in one of which he ascended the highest peak of the range (12,500 feet) north of Amsmiz. He says he has been successful beyond his expectations, and has gathered a store of interesting geographical and geological notes, but not without much difficulty, and meeting with many adventures. He was planning further excursions and is not expected to return to England before the end of the year.

Dr. Junker on Stanley.—Dr. Junker took the opportunity, at a recent meeting of the Swedish Geographical Society at Stockholm, which he attended, to receive the Vega gold medal, to repeat his opinion of the safety of the Emin Pasha Relief Expedition. He said that Stanley would be compelled to obtain food by force for the maintenance of so large a body of men, and that this would render him unable to send messengers back through the tribes thus provoked to hostility. He believed that it was not by way of the Congo, but *viâ* Zanzibar that we may expect news of Stanley's safe arrival at Wadelai.

* Others have calculated the length of the farsakh as follows :—

	Miles.
Sir. J Malcolm, 'Hist. of Persia,' 3 miles 720 yards	= 3·409
V. Klöden, 'Handb. der Erdkunde,' 16,904·4 Paris feet	= 3·413
Pape, 'Griech. Wörterbuch,' 17,659·74 Rhenish feet	= 3·445
H. G. Watson, 'Hist. of Persia,' 3 miles 787½ yards	= 3·447
Woolhouse, 'Weights and Measures of all Nations,' 6076 yards	= 3·452
'Civil Engineers' Notebook,' 6086 yards	= 3·458
Binnings, 'Travels, Persia, Ceylon,' 3¾ miles	= 3·75
Dr. Schlimmer, 'Terminologie,' 6270 metres	= 3·896