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both at sunrise and sunset, there are most brilliant colourings, red, yellow, pink, and purple, and we hope some day Mr. Philby will come back with some coloured illustrations also. I tender then to Mr. Philby, on your behalf, a most hearty vote of thanks.

NOTES ON THE CANAL SYSTEM AND ANCIENT SITES OF BABYLONIA IN THE TIME OF XENOPHON

Major Kenneth Mason, R.E., M.C.

[*Note*: The place-names both in the text and in the maps are as spelled by the author, in conformity with the system of the Mesopotamian Expeditionary Force.—ED. G. F.]

THE story of Cyrus the Younger and his bid for the throne of Persia in B.C. 401 has been made familiar to us by Xenophon. Unfortunately, however, the latter gave us no map of the country he traversed, and the old landmarks have mostly disappeared. From the point at which the invaders entered Mesopotamia to the crossing place of the Greater Zab on their retreat, none of the ancient sites have been identified with any certainty. A land which obliterated nearly all memory of the glories of Nineveh within two hundred years of its sack is not likely to leave much trace above ground of lesser places, such as the Babylonian village of Cunaxa.

Archæologists will no doubt in time lay bare Xenophon's "large and populous city" of Sitace and his "large town of Opis," as they have done in the case of Asshur, Nineveh, Babylon, and many other places of lesser note. Up to the present, however, we have to depend on the commentaries of such distinguished travellers and observers as Chesney, Ainsworth, Sir Henry Rawlinson, etc.

The following notes are the result of an attempt to follow Xenophon in greater detail after having had the advantage of modern methods of travel and observation. Colonel Beazeley has pointed out the application of aerial photography and observation to the delineation of ancient sites, citing the Abbasid city of Samarra as an example. Though inexperienced in archæology, the advantage of flights and motor journeys over nearly all the Mesopotamian country described by Xenophon led me to investigate, as far as I was able, the actual route of the ancient Greeks, and to suggest likely sites for the ancient towns they passed.

The claim is not put forward that these sites are established in any way. This can never be the case until the archæologist has dug up the foundation cylinders or other certain proofs of the identification of the ancient cities. The views set out are the result of investigation of the topography on the ground, and may assist others with more knowledge of the historical and literary side of the question and less perhaps

of the actual local conditions. In the course of the investigation it was interesting to observe many points not actually dating back to Xenophon's time, but indirectly bearing on the question; as, for example, the alignment of certain ancient canals, the changes in the course of the River Tigris, and the sites of certain Abbasid towns and cities.

Most of the views set out below as regards the march of the Greeks were published privately in Mesopotamia. The main criticism put forward against them was the adoption of a fixed value of the parasang. Like the modern farsang of Persia, it was said that the parasang varied according to the nature of the ground. This is doubtless true; but from the mouth of the Araxes (or Khabur) to the River Zabatus (greater Zab) the ground for marching is practically uniform; the rate of marching and hence the parasang would therefore not alter much, and we are justified in assuming an average value for the parasang for this section. The value adopted has been 2·4 miles (see note at end on the value of a parasang).

One critic has suggested that as Xenophon was so exact in his record of distance for certain days, he probably passed "parasang stones" along the route on these days, while on the sections where no distances are given, he was off the main road and the parasang intervals were not marked. This seems an unnecessary assumption; no "parasang stones" have ever been discovered, and milestones in any form may be taken to be a later refinement introduced since metalled roads.

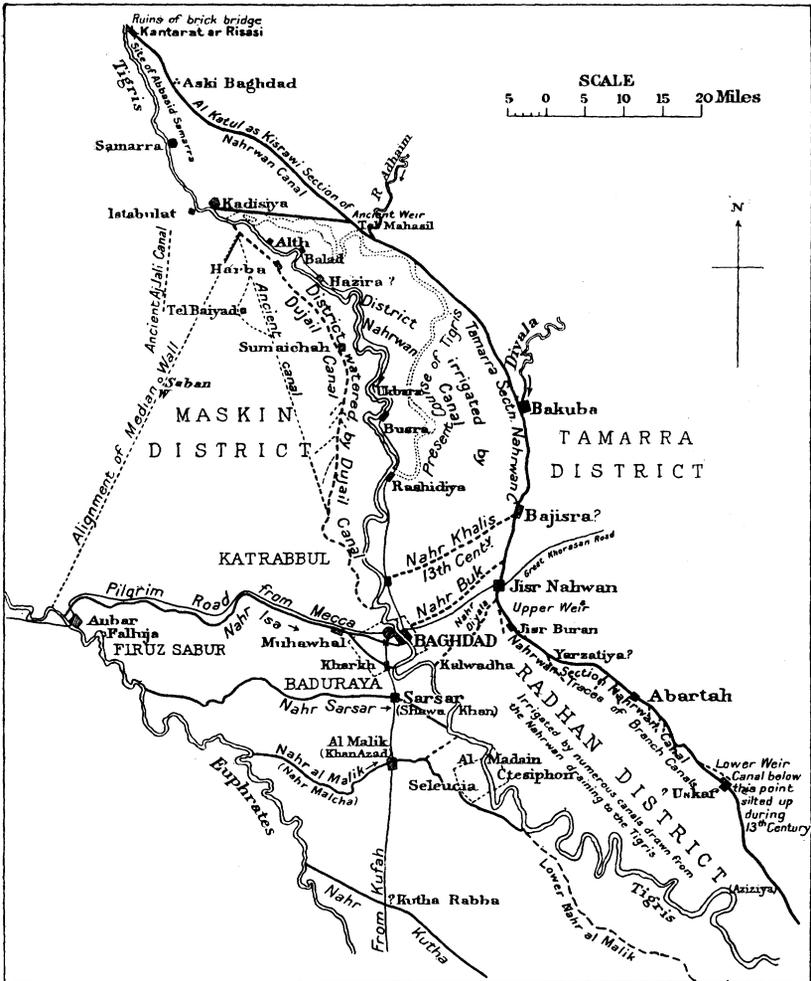
One other criticism may be mentioned here. I have assumed that the Araxes is identical with the Khabur of to-day, which enters the Euphrates some 20 miles below the town of Deir ez Zor, and the Masca with a canal lower down the river. This view was adopted by Chesney and Ainsworth. It has been suggested by a critic that these two streams should be placed higher up, the Araxes being the Belikh and the Masca the Khabur. Examined from a military point of view, the idea has no foundation, if Xenophon's distances are true. The parasang would have to be over 3 miles in length, and Cyrus must have marched at least 270 miles in thirteen days; surely an impossible performance for a force numbering over 100,000 armed barbarians.

Before dealing with the actual route, it is necessary to consider the main changes in the river courses since Xenophon's day. There seems to have been but little alteration in the course of the Euphrates between the mouth of the Khabur and Musaiyib, though the river has scored out its bed to a deeper level. Changes below this point do not concern this subject.

With the Tigris, however, it is a very different matter. The ancient course can to-day be seen from the air and traced on the ground. From an aeroplane this course is apparent with all its curves and loops, and on the ground almost throughout its length there still runs a depression. Some of the names of tels or mounds bear similarity to the towns

mentioned by mediæval Arab geographers as lying on the banks of the Tigris. River-worn gravel has been taken from two places in this ancient bed for ballast for the Baghdad railway.

After observing the old course from the air the author examined the alignment on the ground, comparing the details given by Le Strange in 'The Lands of the Eastern Caliphate.' The river in Abbasid times left



its present bed at Kadisiya, a few miles below the modern town of Samarra. Le Strange mentions that according to Mukaddasi, Kadisiya was famous for its glassworks. To-day near the walls of the octagonal enclosure marking the site and on the river-bank are numerous fragments of glass in the making.

The Abbasid river then passed through the town of Alth (now a mound

of the same name), thence made a loop into the village of Balad (still existing), passing to the north of the town of Harba, a large commercial town close to which the Dujail canal took off. It was here that the caliph Mustansir, in A.D. 1132, built the fine masonry bridge that remains to the present day, though its roadway was destroyed by the Turks in 1917.

After leaving Balad, which stood on its left bank, the Tigris flowed close to the modern Balad railway station, and proceeding south-east and then south, passed within 3000 yards on the eastern side of the Abbasid town of Sumaichah and the mound Tel Maskin. The latter is a big ruin mound somewhat enclosed by various high embankments forming the sides of the Dujail canal constructed at various periods of its history. To-day the surrounding wall of an ancient city is plainly visible here and easily distinguishable from the embankments of the Dujail.

After passing Sumaichah the Tigris flowed in a succession of irregular curves past the town Ukbara, which according to Mukaddasi was large and populous, and then flowed on in its alluvial bed to join its present course about 20 miles in a direct line north of Baghdad near the Abbasid village of Rashidiya. Ukbara, the town mentioned above, is now an extensive ruin mound nearly 2 miles long, littered, like Harba, with broken bricks and pottery. Local tradition attributes 20,000 houses to Ukbara during Abbasid times, but this seems an exaggeration judging by the size of the existing mounds.

This is the ancient course of the Tigris in Abbasid times. It must also have been the course in Sassanian times when the Nahrwan canal was in full use. Observing from an aeroplane at a point directly over the Tigris immediately south of the octagonal walls of Kadisiya, I could see portions of the absolutely straight alignment of an old canal, broken into in places by the present course of the Tigris, and joining the ancient river course at Kadisiya with the Nahrwan close to Tel Mahasil. This canal can only have been one of the earlier heads of the ancient Nahrwan.

It seems possible that this was the Nahrwan intake in pre-Sassanian times, since the section now seen in the best state of preservation is that part between Daur and the Adhaim; this is the section known in Abbasid times as Al-Katul-al-Kisrawi, "the Cut of the Chosroes," and at that time at any rate it was believed to owe its origin to the Sassanian kings (Le Strange, 'The Lands of the Eastern Caliphate,' p. 57). It is known that somewhere between 1226 and 1242 A.D. the Tigris changed to its present course, and from the air it appears that the flood waters must have broken into and scoured out this old canal. There are remnants of an old masonry structure across the present course of the Tigris below Kadisiya, and it seems that these were the old regulator works at the canal head and not a later barrage across the present course.

After breaking into the Nahrwan canal in the thirteenth century A.D. the river was confined for some 10 miles in the low ground in the neighbourhood of the Adhaim, where it forced a way out of the older

canal walls, and flowing southwards regained its ancient course at Rashidiya. Shortly after this the Nahrwan dried up—at first below the lower weir some 14 miles north of Aziziya and then higher up. How much of this was due to the vandalism of Hulakhu Khan in 1258 A.D. is unknown, but it is at least certain that his task of destruction was made more easy by Nature. These courses of the river and canal were probably those of pre-Sassanian days, and it seems at least likely that they were also in use when Xenophon passed this way.

Another point essential to the correct reading of the Greek march is the site of the Median wall. For a long time it has been known that the north-east extremity of an ancient wall exists between Balad and Istabulat and disappears into the desert as far as the eye can see; tradition can only name the founder as Nimrod. But commentators have generally assumed that this is Xenophon's "Wall of Media." Superficially it now exists for a distance of only 6 miles into the desert. I have flown over it and motored along it searching for further evidence of its extension. Are we justified in assuming that in Xenophon's time this wall extended to the Euphrates? There is no mention of it in the 'Anabasis.' In fact Xenophon in his description of his journey down the Euphrates states, "Here Cyrus proceeded one day's march a distance of 3 parasangs, with all his force, both Greek and Barbarian, drawn up in order of battle; at about the middle of the day's march there was a deep trench dug, 5 fathoms wide and 3 deep. This ditch extended up through the plain for a distance of 12 parasangs *as far as the Wall of Media*" (Bk. I. ch. vii. pp. 14, 15). Xenophon also states (vii. 16) that the great king had this trench dug when he heard of Cyrus' intentions. Time was presumably the main consideration, and it is more than probable that the trench followed the shortest possible alignment. The shortest distance from any point on the Median wall to the Euphrates is in direct prolongation of the alignment of the wall.

A small section of a large ancient trench has been found by armoured cars on the desert plateau some 14 miles north of Falluja, and a similar section has been observed by Colonel A. T. Wilson, Civil Commissioner of Baghdad, on a flight to that place from Damascus. Both these sections are roughly in prolongation of the Median wall.

From the above it certainly appears that the Wall of Media actually stopped 12 parasangs short of the Euphrates, and Artaxerxes continued his defence of Babylonia from this southern extremity of the wall to the Euphrates by trench work. If the wall had been continuous, why should he dig the trench?

Xenophon remarks (vii. 15) that the canals were supplied from the Tigris, which is quite possible at this point. Because certain canals are known to have flowed from the Euphrates to the Tigris some commentators of Xenophon have assumed that his statement that the canals flowed the opposite way is an error.

There are still traces west of Sumaichah of an ancient canal, which has no connection with the Dujail. From the air it appears to have left the ancient course of the Tigris near the north end of the Median wall, and then flowed in a south-south-easterly direction towards the Tigris above Baghdad. Even west of the Median wall there are traces of canals from the Tigris up to at least 30 miles from the Euphrates. A case in point is the Aj Jali. Local tradition places this canal in use in "Solomon's time." Its course, according to tradition, is said to have taken off from the Tigris between Samarra and Tikrit, and led far into the desert, passing through the alignment of the Median wall and eventually joining up with the Euphrates in the region of the modern Abu Ghuraib. Two branches are said to have drawn water from it; both these passed through the present Akarkuf Lake.

Normally in the low-river season the Euphrates is 30 feet higher at Falluja than the Tigris at Baghdad; and as neither river rises as much as 30 feet, the Abbasid canal, the Nahr Isa, would always have flowed from the Euphrates to the Tigris. But the latter river at Samarra is nearly 100 feet higher than at Baghdad. A canal, therefore, taking off from the Tigris in the neighbourhood of Samarra would always carry water from the Tigris to the Euphrates at or below Falluja.

The origin and evolution of the ancient canal system is too involved to examine deeply here. During the period of the independent city States of Sumer and Akkad, it is too much to believe that any system on a large scale existed, and each small centre must have had control of its own irrigation resources. After the states merged into an empire, the canal system became more controlled, and the "land between the rivers" was probably irrigated by direct canals and their branches draining from the Euphrates to the Tigris or *vice versa*. Similarly the area on the left bank of the latter was irrigated by the waters of the Nahrwan canal after its construction, which also drained to the Tigris. The latter river was, in fact, the main drain of almost the whole irrigation system of Mesopotamia, and finally formed the marsh land at the end of the Shatt al Hai and head of the Persian Gulf.

As time went on the enormous amount of silt brought down by the canals and the constant dredging of the canal floors caused their banks to become raised 30 to 40 feet above the plain, when it became more economical to cut new canals alongside the old ones. Silt again in the neighbourhood of the Tigris drain caused the necessity of fresh canal outlets lower down the river drain, and the silting up in the canal heads caused fresh intakes to be dug higher up the Euphrates.

A classical example of this is recorded in the Emperor Julian's campaign in A.D. 363. He sailed his transport down the Melcha canal from the Euphrates with the intention of joining up with his Tigris column above Ctesiphon. His intelligence was however at fault, and after reaching the town of Malik (probably the ruins seen round Khan Azad

to-day) he found a new outlet had been cut below the city, and he opened up the old canal outlet above to carry out his object.

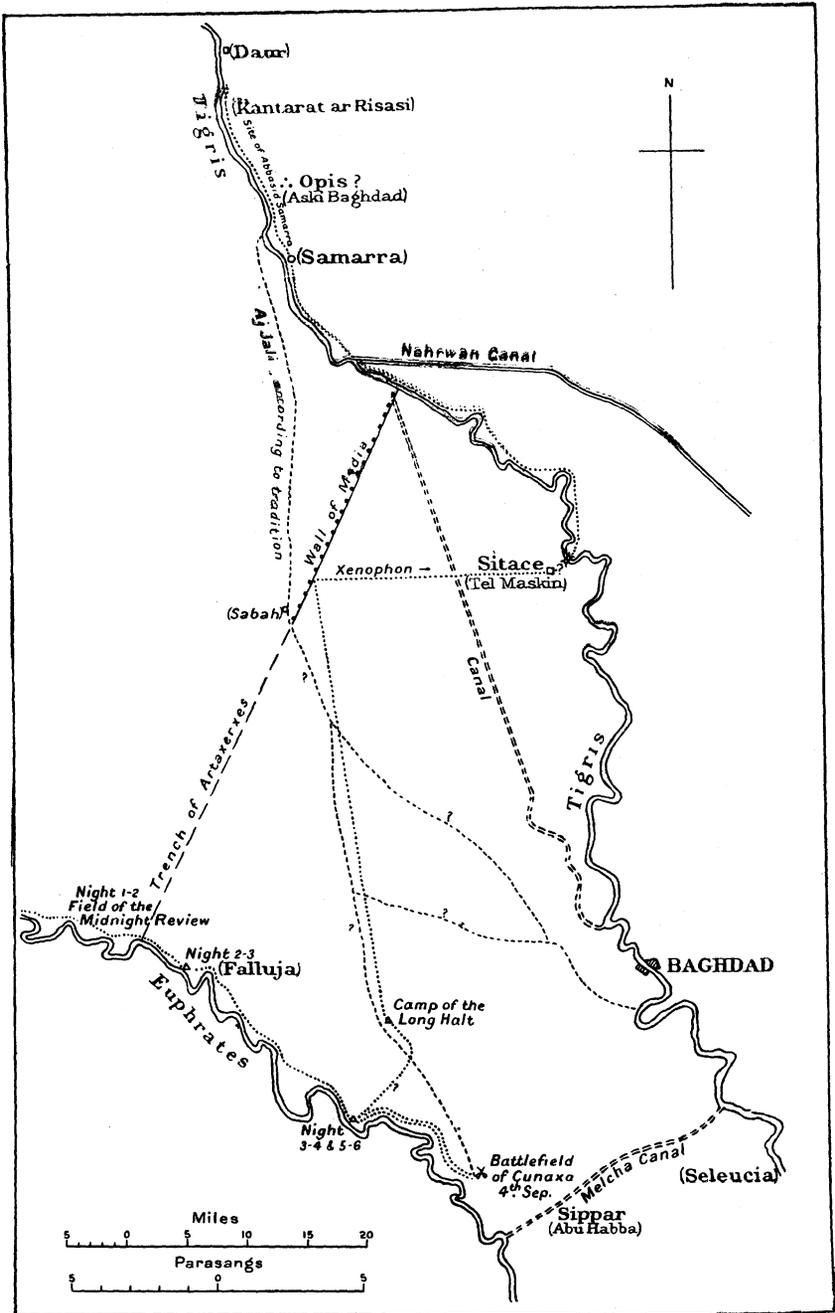
The Tigris then, as the "main drain," seems to have been in use at least until the end of the Sassanian period, when the Tigris seems to have so silted up its neighbourhood that the Melcha canal could no longer reach it except by flowing parallel to it from nearly opposite Ctesiphon to below Kut, and the canal then discharged into the Shatt al Hai, which was during the early Mohammedan epoch the main lower course of the Tigris. This lower Melcha canal from opposite Ctesiphon downwards was probably used later as a drain for the short canals taken from the Tigris on the right bank.

Centuries of disuse and decay, the unrestricted silting-up of years, have made the question of irrigation to-day a much more involved problem. According to Sir William Willcocks' proposals, the lower Melcha canal is to become again a canal with a drain between it and the Tigris; and another drain parallel to this and south of it is to take the drainage from the canals from the Euphrates, between each of which small subsidiary drains are to exist.

In considering the march of Cyrus through Babylonia, a fixed point may be assumed at the mouth of the Araxes, the modern Khabur. From this point to the Gates of Babylonia (from August 9 to 29 according to Kuhner), eighteen days gave a distance of 125 parasangs (I. v. 1 and 5). This places the Gates roughly 27 miles below Hit or about 4 miles above Ramadi. From here Cyrus marched "through Babylonia three days' march, a distance of 12 parasangs" (I. vii. 1); this brought him within 4 miles of the trench of Artaxerxes, where he expected the king to give battle. At this point Cyrus held his midnight review, and the ground on which it occurred works out about 10 miles in a direct line above Falluja and in the neighbourhood of the present head of the Saklawiya canal. Its position and Xenophon's description of the next day's short march of 3 parasangs (I. vii. 14) agree closely with the position of the trench of Artaxerxes discussed earlier in this paper.

The battlefield of Cunaxa has been the subject of much discussion. Ainsworth and others have put it as far south as Musaiyib. Taking into consideration the following points, it seems to be roughly in the position assigned to it by Colonel Chesney, which works out near the present hamlet of Mufraz.

Assuming Kuhner's dates, Cyrus was at the Gates on August 29, and reached his field of review on September 1. On the following day began the cautious march of 3 parasangs in battle array, passing the trench of Artaxerxes halfway. This night the army must have camped near the site on which the town of Anbar was afterwards built. Thence to the battlefield was less than two days' march; for the battle commenced soon after mid-day on September 4. The distances of these marches are not given. But when the news of the king's approach reached Cyrus



Sketch-map to illustrate the Greek March before and after Cunaxa,

his army was much strung out, and some time elapsed before he was closed up. We may safely assume that his baggage was halted at least 1 and probably 2 miles behind. After Cyrus was killed, Artaxerxes pursued Ariæus to the camp and plundered it. But Ariæus fled "through the camp to the station whence they had last started, which was said to be 4 parasangs distant." On the day of the battle, *i.e.* September 4, Cyrus' advanced troops had therefore marched about 11 miles. On September 3 it is unlikely the army marched less than 17 or more than 24 miles, though this is possible after the short march on the 2nd. The battlefield of Cunaxa could therefore hardly have been more than 35 miles, or less than 28 miles from Anbar site, and this places it somewhere in the neighbourhood of Mufraz.

On the night of September 5/6 Clearchus joined Ariæus after a night march of about 12 miles to the site of the camp of the night 3/4, whither the latter had fled, and on the following morning they struck north. The night march of the Greeks would preclude the possibility of a long march, especially in view of the proximity of the enemy and the necessity of careful reconnaissance; it is unlikely that they covered more than 6 or 8 miles.

Xenophon makes no mention of crossing the Nahrs Isa, Sarsar, or Melcha on the way down. The first named was almost certainly not dug,* and the others at this time of year (September), if dug, were possibly dry as the river was low. Mention is however made of ditches and canals which were crossed by the felling of trees on September 7, and it is said that Clearchus "suspected that the ditches were not always so full of water, . . . but thought the king had let the water out on to the plain, in order that even now there might appear to the Greeks to be many difficulties on the march" (II. iii. 13). These ditches may have been offshoots from early Euphrates-Tigris canals, as is generally believed. Nevertheless Xenophon makes no mention of canals taking water from the Euphrates to the Tigris; the intakes of any Euphrates canals which he would have crossed would have been well upstream of Cunaxa, and therefore Artaxerxes would not have been able to give the orders for them to be filled, whereas it would have been easy for him to give the necessary instructions to his Tigris subjects. Xenophon later on mentions distinctly that he crossed canals taking water *from* the Tigris. This all seems to indicate that these ditches were offshoots from some ancient canal, perhaps the Aj Jali whose banks and course are still partly to be seen, to which tradition attaches the period of "Solomon," and whose lower course it places in the neighbourhood of the modern Abu Ghuraib.

On September 7 the king's messenger arrived while Clearchus was inspecting his troops before the march. Negotiations were carried on through the day, so it is unlikely much distance was covered, especially

* Le Strange, p. 30: "Isa was the name of the Abbasid prince who dug the canal."

as ditches and canals had to be crossed and supplies obtained from neighbouring villages. The long halt of twenty-three days now occurred which from all the above considerations would have taken place somewhere in the neighbourhood of the modern Khan Nuktah, about halfway between Baghdad and Falluja.

Now comes the march of three days to the wall of Media. Some commentators make the Greeks go back to the Euphrates; others pass them through the Median wall and back again. But, as noted above, it is unlikely that the wall approached nearer to the Euphrates than 12 parasangs at this period. There is difficulty in the original text here, and it is doubtful whether the Greeks passed through the wall or not. Ainsworth in his commentary sums up the arguments for and against. As will be seen later when working Xenophon's distances backwards, it seems impossible that the Greeks passed through the wall, but passed its northern extremity on the other bank of the Tigris between Sitace and Opis.

There seems no justification for assuming that they travelled back from the neighbourhood of Khan Nuktah to the Euphrates; in fact there are strong reasons against it. There is no mention of crossing the trench of Artaxerxes again, which went 12 parasangs from the river to the wall. Ariæus, the only one who knew the country, had definitely said: "If we were to return by the way we came we should all perish of hunger; for we now have no supply of provisions, and for the last seventeen days' march, even when we were coming hither, we could procure nothing from the country through which we passed" (II. ii. 11). Their intention appears to have been to make for the Tigris, and they struck the Median wall after three days' march; a bearing very slightly west of north would bring them in three marches averaging $12\frac{1}{2}$ miles each to the Median wall due west of Sumaichah. As regards water for these three days, the ancient Aj Jali and its branches, which are said to have flowed past the present Akarkuf lake would have supplied ample.

The position of Sitace has always been the subject of considerable controversy, as has also been that of Opis. However, the identification of the Zabatus with the greater Zab is established; and working back from this point towards Sitace, almost the exact distances of Xenophon give us the following very interesting information. The distance between the mouths of the two Zabs works out at 24 parasangs. Between the Lesser Zab and Kantarat ar Risasi at the mouth of one of the later Nahrwan canal heads is about 28 parasangs, while that between the Lesser Zab and Aski Baghdad is about 31 parasangs.

Considering the ancient course of the Tigris as already traced out above, the interesting point is that the distance between Aski Baghdad and the old Tigris due east of Sumaichah is almost exactly 20 parasangs, and a line from the Tigris at this point to the Median wall due westwards is exactly 8 parasangs. Now this is the point on the Median wall to

which we brought the Greeks above, and it is interesting to follow Xenophon in connection with the march onwards. The passages in the *Anabasis* as translated by the Rev. J. S. Watson are as follows :

From the Wall of Media, "they proceeded in two days' march the distance of 8 parasangs ; . . . They then arrived at the Tigris, near which was a large and populous city called Sitace, distant from the banks only 15 stadia. In the neighbourhood of this city the Greeks encamped close to an extensive and beautiful park thickly planted with all kinds of trees. The Barbarians, though they had but just crossed the Tigris, were no longer in sight" (II. iv. 13).

Even to-day Sumaichah almost fits the description, if we read "village" for "city." The present site has been occupied since early Abbasid times, and the inhabitants showed me to its south the ruin mound Tel Maskin, which they said was very much older. This mound is almost exactly 15 stadia from the ancient course of the Tigris at this point, and if the course of the Dujail canal (if it existed then) lay at that time to the west of the mound, or if another canal, as seems more likely from the air, flowed well to the west of it, the destruction of the Tigris bridge at this point, suggested by Ariæus to Proxenus, would have hemmed the Greeks in between the river and the canal.

"From the Tigris they proceeded, in four days' march, a distance of 20 parasangs to the river Phycus, which was a plethrum in breadth, and over which was a bridge. Here was situated a large town called Opis" (II. iv. 25). As stated above, 20 parasangs from the ancient Tigris opposite Sumaichah brings us to a point between Aski Baghdad and Kantarat ar Risasi. It seems that underneath the ruins of Aski Baghdad, or immediately north of it, must lie the site of ancient Opis.

"Hence they proceeded through Media six days' march through a desert country, a distance of 30 parasangs, when they arrived at the villages of Parysatis, the mother of Cyrus" (II. iv. 27). This almost exactly brings us to the mouth of the Lesser Zab, where we might expect a cluster of villages. The country between the head of the Nahrwan canal, as far as at any rate as the Jebel Hamrin, would naturally be largely desert, while that below would be green and fertile.

The final phase of the march to the Greater Zab is recorded thus by Xenophon : "Hence (*i.e.* from the villages of Parysatis) they advanced in a march of five days more, through the desert, a distance of 20 parasangs, having the Tigris on their left. At the end of the first day's march there was situate on the opposite bank of the river a large and opulent city called Cænæ . . ." (II. iv. 28). "Soon after, they arrived at the river Zabatus . . ." (II. v. 1). As stated above, the distance between the two rivers is actually about 24 parasangs, and Cænæ would be situated over the site of ancient Asshur and at the present Kalat Shargat, or slightly to the south of it.

There seems to be no objection to placing Sitace in the neighbourhood

of Sumaichah; but there are difficulties in accepting Aski Baghdad as the site of Opis.

In the first place, Nebuchadnezzar speaks of the Outer Rampart of Babylon as extending from Opis to Sippar. This would seem to place it in the neighbourhood of Baghdad or Seleucia. If this is the case Xenophon's distances are hopelessly inaccurate; for even if his Opis were as low as Baghdad, the parasang value would have to be over 4 miles; that is, Cyrus must have marched an average of 28 miles for thirteen consecutive days down the Euphrates. A new Median wall would also have to be discovered or assumed. Is it not possible that this Median wall was Nebuchadnezzar's outer rampart, and that Opis was somewhere in the neighbourhood of its northern end? Another city of a name very similar to Sippar (which archæologists have placed definitely at Abu Habba) might lie on the alignment of the Median wall, either in the desert or on the Euphrates. To-day in the desert, 12 parasangs short of the Euphrates and in this alignment, there is a well called Sabah. Is it possible that somewhere hereabouts exist the ruins of a Babylonian city, watered by the ancient Aj Jali canal?

Winckler places Opis in the neighbourhood of the mouth of the modern Adhaim, and Tel Manjur has been considered as a possible site. It certainly gives us a river identification for the Phycus, for if the section of the Nahrwan canal westward of the Diala was not dug until the Sassanian period, the Adhaim must have entered the Tigris about 8 or 10 miles below Balad. But if Opis was here the bridge near Sitace was, according to Xenophon, 20 parasangs downstream of it, and therefore at least as far south as Baghdad. This point is considerably more than 8 parasangs from the nearest point of the Median wall. In fact, unless the value of a parasang is increased to more than $2\frac{1}{2}$ miles and traces of a new Median wall discovered or assumed, no site for Sitace further down the Tigris than the neighbourhood of Sumaichah is possible.

Alexander the Great, using river transport, travelled up the Tigris to Opis, which he reached in the summer of 324 B.C. I do not know in what month he arrived, or whether Opis was the limit of navigation for his ships. But nowadays in June the Tigris would still be navigable for sailing craft drawing 5 feet of water as far as Tikrit, and it seems certain that during the ninth century A.D. the river must have been navigable as far as the military capital of the Abbasid Caliphs. Modern mahailas (native sailing craft) do not usually go above Samarra owing to the current in the high-water season (March and April) and to the lack of water during the months of low level (August to January). This point, however, is of little importance, since the Tigris, like most silt-laden rivers flowing in a plain, tends to become less navigable as its delta and its meanderings increase with age.

If Opis, then, is placed in the neighbourhood of Aski Baghdad, where was the River Phycus? It may have been the Abu-l-Aswad depression;

but this is so slight now that I have motored over it without seeing any signs of it. Colonel Rawlinson was inclined to believe that the Phycus was only a canal (its width being a plethrum, or roughly 100 feet, tends to confirm this), and compared the case with the Dardes and Masca (I. iv. 10 and I. v. 4). Ainsworth in his commentary followed Rawlinson and identified the Phycus with the Nahrwan canal; and it seems that if this northern section of the Nahrwan was not dug until the Sassanian period, either some previous canal, possibly a loop canal, must have existed before it; or the Wadi Milh, which is dissipated now in a salt depression some 16 miles north-east of Aski Baghdad, originally found its way to the Tigris before the upper Nahrwan was cut. The latter seems hardly possible except after heavy rainstorms in the Jebel Hamrin. The only other alternative is that Opis is nearer the modern Samarra, and possibly close to Kadisiya, though this makes Xenophon's distances more inexact.

One trouble in identifying the site of Opis with any place between Kantarat ar Risasi and Kadisiya is that the whole ground was subsequently built over during the ninth century A.D., when Samarra formed the court and the military capital of the Mohammedan Empire. Any relics of an earlier prosperity would lie deep under the ruined splendour of the Abbasid Caliphs.

THE VALUE OF A PARASANG.

The exact value of a parasang is not known, and any examination into Xenophon's distances must be preceded by an investigation into the value of his unit of length. Colonel Chesney applied a different value according to the nature of the ground passed over. As far as Thapsacus on the Euphrates, he assumed it to be 2·608 geographical miles; beyond that point his value is very nearly 2 miles. Major Rennell estimated the parasang at 2·25 miles. As Chesney observes, "the modern farsang or barsakh of Persia varies according to the ground," and as it seems likely that the parasang did likewise, for the purpose of Xenophon's Babylonian marches it should be sufficient only to consider those marches from the crossing at Thapsacus to the arrival at the Zabatus, where the march rate would be more or less uniform.

Excluding the marches in the proximity of the enemy, we have :

(a) 9 days' march	50 parasangs	(I. iv. 19)	5·55 average per day
(b) 5 "	35 "	(I. v. 1)	7·00 "
(c) 13 "	90 "	(I. v. 5)	6·92 "
(d) 2 "	8 "	(II. iv. 13)	4·00 "
(e) 4 "	20 "	(II. v. 25)	5·00 "
(f) 6 "	30 "	(II. v. 27)	5·00 "
(g) 5 "	20 "	(II. v. 28)	4·00 "

Xenophon particularly mentions that in sections (b) and (c) some of the marches had to be made exceptionally long.

The following table gives the average day's march in miles for different values of a parasang :

	2	2'1	2'2	2'3	2'4	2'5	
<i>a</i>	11'1	11'7	12'2	12'8	13'3	13'9	for 9 days
<i>b</i>	14'0	14'7	15'4	16'1	16'8	17'5	„ 5 „
<i>c</i>	13'8	14'5	15'2	15'9	16'6	17'3	„ 13 „
<i>d</i>	8'0	8'4	8'8	9'2	9'6	10'0	„ 2 „
<i>e</i>	10'0	10'5	11'0	11'5	12'0	12'5	„ 4 „
<i>f</i>	10'0	10'5	11'0	11'5	12'0	12'5	„ 6 „
<i>g</i>	8'0	8'4	8'8	9'2	9'6	10'0	„ 5 „

From a consideration of the above figures, it seems that the most acceptable value of a parasang for the Babylonian marches is about 2'4 miles; and this is the value that has been assumed.

THE ECONOMIC LIMITS OF AEROPLANE PHOTOGRAPHY FOR MAPPING, AND ITS APPLICABILITY TO CADASTRAL PLANS

Lieut.-Colonel H. S. L. Winterbotham, C.M.G., D.S.O.

IN his interesting article in the September number of the *Geographical Journal*, Lieut.-Colonel S. F. Newcombe, D.S.O., R.E., discusses the practical limits of aeroplane photography for mapping. His estimates of cost, descriptions, and examples are drawn from Egypt or Palestine, and he is careful to state that in countries like England where maps already exist on accurate scales and the weather is so unreliable, air photography may not be successful.

The difficulty of employing air photography in the construction or revision of large-scale maps has been mentioned frequently. It is familiar to practical surveyors, but it is not generally known to those who are interested in maps and in their production without being familiar with the technical methods involved. Survey departments charged with the revision of an established cadastral survey, are faced then with special problems, and it may be of interest to discuss why air photography fails, for the moment, to afford a prospect of improvement or economy in dealing with them. It will be necessary in the course of these few lines to quote figures illustrative of the cost of various methods. Those quoted will, following Colonel Newcombe's example, be based on pre-war rates; a procedure which will make a comparison with his figures the easier, and will avoid the difficulty of estimating on the fluctuating and uncertain prices of to-day.

The Ordnance Survey produces maps on scales which vary from 1/2500 to 1/1,000,000—from cadastral to geographical. In spite, however, of this range of scale, survey and revision on the ground is chiefly confined to the 1/2500. There is, it is true, a special revision for the