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Millenary of
Abū Raihān Muhammad Ibn Ahmad Al-Birūni

THE STATIONS OF AL-BIRUNI
ON THE JOURNEY
FROM GHAZNA TO PESHAWAR.

by

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by A.D.H. BIVAR

The privilege of saluting the achievements of Abū Rayhān Muḥammad ibn Aḥmad al-Bīrūnī is one that is eagerly welcomed by the informed scientist and scholar in every branch of learning. Celebrated above all as astronomer and mathematician, the sage whom we honour on this occasion stands, as the earlier papers of this Congress will have amply shown, in the topmost rank amongst the scientists of mediaeval Islam and indeed of all ages. A keen and critical observer of natural phenomena, he was at the same time ready, in the humane tradition of his day, to extend his interest to the whole body of available knowledge. Everywhere he shows an objectivity and clarity of judgment such as even our technological century can justly envy. His standing as a truthful and perceptive witness will be evident to the careful reader at every turn. His researches amongst the stars are indeed widely famed. Yet he devoted perhaps his most remarkable treatise to the mineral treasures of the earth; and moreover in his latest book, he explored the medicinal virtues of the vegetable kingdom. At the same time it should not be forgotten that Abū Rayhān possessed outstanding talents as a historian, and indeed took a lively interest in the evidence for the human past offered by archaeological remains. His early work, al-Āthār al-bāqiya (well known in English under the title 'The chronology of ancient nations') provides extensive material of fundamental value to the historian, and the same can be said of his treatise on India and Indian astronomy, the Kitāb mā lil-Hind, which I shall be citing under its English title of the Indica. The student of political events will constantly regret that his strictly historical works, the account of the sage's homeland contained in his Kitāb al-musāmara fī akhbār Khwārizm, and the description of the heterodox sects contained in his Kitāb fī akhbār al-Mubavviḍa wal-Qarāmiḍa have never been recovered. For the purposes of the present paper the loss of his early Ghaznavid history, the Tā'rikh avyām al-Sultān Maḥmūd wa akhbār abīhi leaves a special gap.

The rather patchy and uneven coverage of the reign of Maḥmūd of Ghazna provided by the other historical sources would have made doubly precious the evidence of so perceptive an eye-witness, and one moreover with an interest in recording unusual details. It is worth noting, in the course of the present paper that several fragments of historical information to which our author's geographical discussions in the Tahdīd and the Qānūn indirectly allude are interestingly echoed by the anecdotes of Ghaznavid history contained in the text by Fakhr-i Mudabbir, Ādāb al-ḥarb wal-shajā'a. The possibility of a source relationship with the Ta'riḫ avvām al-Sulṭān would be worth examining. Yet even if no direct link should be established, there is no doubt that the narratives of Fakhr-i Mudabbir closely reflect the world of al-Bīrūnī's journeyings.

The aim of the present paper is to examine, from the viewpoint of its archaeological interest, the topographical data for the district between Ghazna and Peshawar contained in the Gazetteer of the Qānūn. It is contained chiefly on Volume II, pp. 561-2 and 573-4 of the printed edition. We have tried to check the latitudes and longitudes given in this work for the various ^{towns}; to see how far they agree with the values given elsewhere in the author's works (which they often do not); and to establish, when the sites are known, to what extent they agree with currently accepted values. In the light of these results an attempt is made to apply al-Bīrūnī's co-ordinates for sites that are not yet identified, to ascertain how far these too may appear plausible, and what lead they may offer for future exploration.

My interest in the verification of al-Bīrūnī's latitudes and longitudes in the neighbourhood of Ghazna arose originally from a wish to identify the site of the historical township of Sakāvand. This was a place that played a significant part during the advance of Islam towards the Indus plains. The first mention of it which I have found is in an anecdote of al-'Awfī's Jawāmi' al-ḥikayat relating to an event of the Hījrī year 283. The Ṣaffārid prince 'Amr b. Layth had sent as prefect to Ghazna an officer named Fardaghān. This official decided to launch a raid against Sakāvand, which lay in the nearby territory of the Kābulshāh.

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The Shāh reigning at this time was named Kamalūka. He appears in the Persian narrative as Kamalū. With a force of 4000 horseman, Fardaghān entered his territory and succeeded in surprising Sakāvand, where there existed a wealthy temple containing images, and which was much frequented by pilgrims coming from the east. Fardaghān captured the town, put its inhabitants to flight, and seized a rich booty. Following normal Islamic military practice he dispatched a portion to 'Amr, his prince, and divided the residue with his men. However, the Kābulshāh was naturally incensed at such a hostile act, and planned severe reprisals. He gathered a powerful army, and prepared to advance upon Ghazna. The point of the anecdote then lies in the strategem by which Fardaghān persuaded the Kābulshāh to delay the completion of his plan. He sent messengers to his overlord, 'Amr, who was threatened with difficulties of his own from the impending invasion of his territory near Balkh by Ismā'īl the Sāmānid, and asked for large reinforcements to resist the attack. The adventurous prefect need not have expected very effective help, in view of the military situation, but he also arranged for a leakage of information to the Kābulshāh, to the effect that very large forces were on the way, and that the armies of Kabul were about to fall into a trap. Understandably Kamalūka delayed his advance, and began to move with exaggerated caution. Thus Fardaghān was able to hold out until at last a sufficient force arrived to enable him to beat off the attack.

It was not until the establishment at Ghazna of the House of Sebuktegīn that Sakāvand is next mentioned in the historical narrative. In the Hudūd al-'Ālam, a geographical work completed in A.H. 372, Sakāvand is mentioned as a place possessing a strong fortress. It appears, rather unexpectedly, in the Garshāspnāma, the fanciful reworking of the famous Zoroastrian legend composed in verse by the younger Asadī during his residence at Ghazna. The original form of this legend seems to have been popular in the Sīstān area, and its most spectacular episode was the slaying by the hero Garshāsp of a monstrous dragon. Yet it is hardly to the Zoroastrian tradition that

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so remote

Asadī owes the location of this combat at a spot from Zoroastrian Iran as Sakāvand. It is more likely that the mention of this locality was one of many touches of local colour appropriate to the lifetime of Maḥmūd of Ghazna which Asadī has woven into the traditional story. At the same time, his association of Sakāvand with a monstrous serpent is by no means an irrelevant one. We learn from the memoirs of the Chinese Buddhist pilgrim Hsuan-Tsang, who visited the Kabul Valley shortly before the coming of Islam, that there were many legends current in the region concerning the Nāgas, those supernaturally-endowed serpent-creatures of the Buddhist tradition, who are also prominently depicted in Gandhara art. It is a fact that cobras are not uncommon at the present day along the Kabul River and its tributaries, and their legendary role as the guardians of temple treasures is also still remembered, as I shall shortly show.

Of all the early references to Sakāvand in Muslim literature, the most informative from the factual point of view is, characteristically the brief notice by al-Bīrūnī (Qānūn, II, 574) where the description occurs in the list of longitudes and latitudes:

Qal'at Sakāvand fī rustāq Lahūgar

'The fort of Sakāvand in the rural district of Logar' and this description is followed by the co-ordinates. The specific localisation of the town in the broad valley of the Logar, immediately to the south of Kabul behind a line of hills, greatly narrowed the area of search, and led me to hope that it might be possible to identify the township upon the ground. I decided to work out the co-ordinates in order to ascertain whether they would fix precisely the position of the site.

The latitudes and longitudes quoted by al-Bīrūnī are specified according to the Abjad system of numeration. Their conversion to modern numerals is therefore simple. With regard to their basis of calculation, that on which the latitudes are reckoned is the same as that used by geographers to-day. Leaving aside possible errors of calculation, or

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discrepancies resulting from the fact that the great astronomer was working with very simple instruments, these are figures which can be directly transferred to the modern map. To convert his longitudes involves a slightly more elaborate calculation. In ancient and mediaeval times, no certainty existed that the shape of the Earth was spherical, and would therefore cover the complete circle of 360°. Instead, the custom had become established of measuring eastwards by degrees from the Canary Islands, rather than as to-day from Greenwich or elsewhere. However, for these regions far to the west of his own area of research, al-Bīrūnī was compelled to rely either on traditional figures going back to Classical Greek times, or on the calculations of his mediaeval contemporaries. It is true that in a number of his works, and especially in the Tahdīd, al-Bīrūnī exercised the greatest care in establishing the correct number of degrees of longitude lying to the west of his own centre at Ghazna. However, it will simplify matters considerably if I take no account of those problems at the present moment. For as I have said, it is clear that when he compiled the tables of co-ordinates contained in the Qānūn, his base was at Ghazna. He had also indeed undertaken detailed calculations to fix the position of the town of Bust on the Helmand. These researches were contained in his lost work, Fi taqwīm al-qibla bi-Bust bi-tashīh tulihā wa-'ardihā (On the fixing of the direction of prayer at Bust by correcting its longitude and latitude), and the recovery of this work would certainly have been of the greatest interest for our present purpose. Our author was, in fact, the first Muslim geographer to concern himself systematically with places to the East of Ghazna, and all the co-ordinates established by him for those areas are evidently derived either from his own observations (no doubt with those of assistants and informants), or from written sources checked and approved by him. The point of departure for all these calculations is no doubt provided by the position of Ghazna itself, which he had calculated with great care, as explained in the Tahdīd. Thus for locating any more easterly site, it is reasonable to ignore any errors that may have existed in older surveys for regions

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further to the West, and concern ourselves simply with the difference between the longitude of Ghazna, as reckoned by al-Bīrūnī, and that of the other localities. The simplest way of reckoning this difference is to ascertain the difference between al-Bīrūnī's figure for the longitude of Ghazna, and that established at the present day. When this difference is subtracted in turn from his figures for other stations, these also will be converted to compatibility with the modern map.

In round figures, al-Bīrūnī's co-ordinates for Ghazna are Long. $94^{\circ} 20'$ East by ^{Lat.} $33^{\circ} 35'$ North (Qānūn II, 561). The calculations are worked out more precisely in the Tahdīd, where the Longitude is shown as $94^{\circ} 22' 24''$; but such theoretical precision confers no real advantage, since the procedures that lead up to it are admittedly rather approximate. Modern authorities give the longitude of Ghazna as $68^{\circ} 18'$, and if this figure be subtracted from that of al-Bīrūnī, the difference is $26^{\circ} 02'$. In subsequent calculations this will be rounded off to 26° , since it is evident that the instruments in use at the time could not measure reliably a single minute of arc. If then this difference of 26° is subtracted from the other longitudes given in the Qānūn in the region east of Ghazna, they should be reduced to the same basis as that used by modern geographers, and the cumulative errors resulting from the reckoning from the Canary Islands should be eliminated. Any residual errors should result either from manuscript corruptions, or else from errors of observation at the particular localities, which we may subsequently hope to detect and explain.

At this point it may be convenient to give a list of the sites which are to be discussed in this paper. These are as follows:

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|-------------|----------------|
| 1. Ghazna | 9. Ribāṭ Kindī |
| 2. Sakāvand | 10. Fathābād |
| 3. Kābul | 11. Dunpūr |
| 4. Jayfūr | 12. Peshāwar |
| 5. Parvān | 13. Karūr |
| 6. Bāmiyān | 14. Farmul |
| 7. Nejrāb | |
| 8. Lānghān | |

I can now return to the localisation of Sakāvand, for which the co-ordinates given in the printed text of the Qānūn, II, 574 are ^{صنزل} ^{ع م} When the abjad numerals are converted to modern notation the result is $97^{\circ} 30'$ East by $33^{\circ} 40'$ North. We have next to subtract 26° from the longitude, as already explained, to adjust it to the modern computation. The result is $71^{\circ} 30'$ East by $33^{\circ} 40'$ North. This location is evidently far to the East, and in the vicinity of Peshawar, and definitely not within the confines of the Logar Valley. It is therefore obvious that the figures in the printed text are faulty here, but to emend them conjecturally would be dangerous. I had, therefore, run up against a difficulty at this point, when fortunate circumstances led to a solution.

During 1969 I spent the summer at Kabul, and happened to be visited there by an enterprising lady pupil, a Dr. Bhatia, who was then returning from England to Delhi. We discussed the problem of locating Sakāvand, which I conjectured should be somewhere in the region of Pul-i 'Ālam, a well known village of the Logar. A few days later, by happy chance, she was conversing with an Afghan historian well acquainted with the district, who happened to mention that the village of Sakāvand was well known to local residents, and presumably occupied the mediaeval site. We promptly applied to make a visit to the place, and are grateful to Dr. Mustamindy of the Afghan Institute of Archaeology for approving our journey, and sending with us as official representative Mr. Aram, a young and active member of his Institute.

The village of Sakāvand proved to be situated some 12 miles South-west of Bārakī Bārak, the present administrative centre of the Logar. I should perhaps mention that that township is famous as one of the few places in the border region where the old Ormuri language is still spoken. Residents of Peshawar are likely to recall that there are several villages situated east of Peshawar City which are named after the Ormurs, and are said to have been founded by people of this tribe, though I am told the Ormur language is not spoken around Peshawar to-day.

There are, however, said to be speakers of Ormuri still residing at Kāniguram in Wazīristān. The history and origins of the Ormuri tribe are likely to be of interest for residents of Peshawar, and for this reason I mention their survival at Barakī Barak. At Sakāvand, however, the villagers were Pushtu-speaking, and when asked about the historical remains, they guided us to a prominent spur situated just behind the village. Along its crest ran a spine of rock to which could be seen clinging the remains of mud walls, and of a strong gatehouse built in the same material. The shape of the doorway, with a slightly pointed arch, supports an attribution to the Ghaznavid period. The remains are by no means well preserved, but they teach the valuable lesson that hope should not be abandoned of fixing the dates of the various indeterminate mud forts which are found everywhere in the Frontier region. Often the shape and style of their arches and gateways can help to fix the date, so that a ruined and seemingly unimportant fort may prove to be an unrecognised monument from the heroic days of Islam. In the case of Sakāvand, as I hope to show, there can be little doubt that the mud fort illustrated in my slide is that which was standing in the time of al-Bīrūnī, and which is mentioned in the Qānūn. It is not unlikely that the astronomer spent the night here on one of his journeys to India, for one of the two possible routes would have passed this way. He may also have made on the spot the observations on which his co-ordinates are based, and to which I shall return.

A pre-Muslim temple was said to have existed at Sakāvand at the time of 'Amr b. Layth. On the ground it may be seen that the remains of the castle stand above, and partly overlie, a great square platform which occupies the end of the spur. The nature of the underlying structure is not revealed by surface inspection, but towards the east end some stonework has been revealed by erosion. We see here a rough type of diaper masonry, somewhat resembling indeed that of the Buddhist stupas, yet decidedly rougher and more irregular. The square channel running across the top of my slide was formerly occupied by a great beam of timber revetment, of which fragments were still to be seen where it

at Kabul

entered the stonework. For the Institute of Archaeology we were able to collect a specimen of this stonework, which proved to be derived from a great deodar tree, Cedrus Deodara, such as once grew in profusion in Khost, and northwards as far as the Peiwar Kotal, and on some of the spurs of the Spinghar Range, but are said to survive in relatively small numbers to-day. The nature of the building that once stood below the fort of Sakāvand is still obscure. It may originally have been a Buddhist stupa of the Kushan period, perhaps adapted to Hindu use by the later Brahmin kings of Kabul, yet the domed outline typical of a stupa was not to be seen. Again, it may have been a Kushan building other than a stupa, for example a fire-temple similar to the monument at Surkh Kotal which has now become famous. Again we may consider that it was a building founded for Hindu worship under the Kabulshahs, and founded perhaps no earlier than the 7th century A.D. These, of course, are questions that will only be answered, by an institute with adequate resources, and at some future date.

At any rate, there is little doubt that these are the remains of the historic township of Sakāvand. We can now return to the question of its co-ordinates. On the modern map, the location appears to be Long. 68° 47' East by Lat. 33° 57' North. We can see now that the figure for the longitude is wrongly pointed in the printed text of the Qārūn. Instead of صنزل we must read صدل which gives 94° 30' East on al-Bīrūnī's notation. After the subtraction of 26° the result will be 68° 30'. The error here, if error there be, is certainly not excessive, since his longitude falls only 15 miles from the true position of Sakāvand. His latitude of 33° 40' is similarly 17' less than the location given on modern maps, again a discrepancy of a little over 15 miles. However, before regarding as final our evaluation of this result, it seems desirable to check that the position on modern maps is strictly accurate and based on actual

observation. It should also be remembered that computations of latitude are dependent on almanacs, and those available to al-Bīrūnī, as he often points out, were not always reliable. It would be interesting to learn the views of a qualified navigator who had gone over the workings of al-Bīrūnī as given in full, for example, in the Tahdīd, since it may be that the small discrepancy could be explained. At any rate, the example of Sakāvand seems to show that when co-ordinates given are those of places accessible to our author, and the figures are given on his personal authority, the results are sufficiently accurate to be of help to the student of topography.

It is possible to travel from Ghazna to Peshawar by way of Sakāvand, turning right into the Logar Valley from the Ghazna-Kabul road, and continuing past the ancient and celebrated village of Charkh, and thence by several possible routes to the Jalālābād plain. Having mentioned the village of Charkh, I cannot fail to notice its remarkable old mosque, which is the pride of the place. The mihrab and qibla wall of the building are decorated with carved wooden panels bearing hexagon designs with Kuranic inscriptions in Kufic script. This work is certainly as old as the Ghaznavid period, and it is not impossible that our author may himself have visited and prayed in this mosque. With its running streams and orchards, the village of Charkh is likely to have a considerable population of cobras. I was interested when the mutawallī of the mosque told me that the room behind the mihrab where valuables were kept was frequented at night by a cobra which guarded it from intruders. One naturally thinks of the Naga cult prominent throughout this district in pre-Islamic times, and known also at Sakāvand according to the tradition of the Garshāspnāma.

The more frequented road from Ghazna to the plains runs directly through Kābul. In the Qānūn (II, 574) the co-ordinates given for this famous city are ٤٥ ٤٥ ٤٥ ; this is converted into modern numerals as $95^{\circ} 20'$ East by $33^{\circ} 45'$ North. Once more we subtract 26° from the longitude, leaving $69^{\circ} 20'$ East by $33^{\circ} 45'$ North.

On the modern map the longitude is only $10'$ less, a very close approximation even if we have to assume that all the error here is on al-Bīrūnī's side. The latitude, however, in the printed text of the Qānūn is more than a degree too low, and thus evidently wide of the mark. However, this is not the end of the problem, as there are substantial reasons to believe that the figure of the Qānūn is here not that of al-Bīrūnī at all. For in the Tahdīd, written as early as A.H. 416 (tr. Jamil Ali, Beirut 1967, p. 86) our author gives a detailed account of the operations which he conducted at a village named Jayfūr, near Kabul, from which he calculated the latitude of that place as $34^{\circ} 41'$ East, a figure less than $5'$ in excess of that shown by the present map. The village of Jayfūr seems not to be known to-day, but whichever side of Kabul it may be supposed to have stood, the result comes very near to the correct figure. There exists also a further calculation of al-Bīrūnī for the latitude of Kabul, quoted this time in the Indica, where the figure is $34^{\circ} 47'$. Though the figure for Jayfūr seems on present-day reckoning the most accurate, the last figure could be reconciled if we assume that that village lay 7 miles south of Kabul, the former figure being that for the village, and the latter for the city itself. The first of the three figures, that of the Qānūn, is at first sight inexplicable. There are two hypotheses which might help to account for it. In the scientific works of the Muslim Middle Ages, the numerical entries are not always found to be correct. The student would be expected to read the calculations and arguments, and work through the reasoning for himself. He was expected to detect if the figures were corrupt, and substitute the results of his own working. Not only were there sometimes copyists' errors in the manuscripts; sometimes also the authors may have included erroneous figures to check the attention of their students. Similarly, where parallel works gave better results, the student might be expected to have knowledge of it.

Another hypothesis may be considered to explain these discrepancies.

The tables of co-ordinates given by al-Bīrūnī may have been based on an earlier table, for the tradition of such gazetteers goes back to the *Geographica* of Ptolemy, each successive author may have made his own corrections and additions, while retaining some of the figures given by his predecessor. In just the same way, Akbar's minister Abu 'l-Faḍl reworked the lists of al-Bīrūnī, yet the origins of the later gazetteer are evident from the presence in it of such names as, for example, Ribāṭ al-Amīr, which we shall shortly discuss. We shall see that this settlement was founded only under Sebuktegin, and must have disappeared after the Ghaznavid period. It can hardly have been frequented during the time of Akbar, and its full co-ordinates seem to have been unknown to Abu 'l-Faḍl. In just the same way, al-Bīrūnī may have been employed in up-dating and correcting an earlier list. Where the results of his own observations had been given in previous works, he may simply have allowed the traditional figures to stand, but expected, perhaps, that the student would be of the correction.

It is likely that when our author was brought from Khwārizm to Ghazna in the train of Maḥmūd in A.H. 408, he travelled by way of Bāmiyān and Parwān. We may turn aside from the direct route for a moment to examine his data on these localities. Parwān is known as a mint of Ghaznavid coins, and the scene of a battle of Jalāl al-dīn Mengubirtī against the Mongols. It is supposed, without definite evidence, to lie in the neighbourhood of Charikār. The co-ordinates in the *Qānūn* are **دره صدی**. I no longer show my working, but give the converted equivalent as 68° 10' East by 34° 35' North. Chārikār is almost due North of Kabul, but this longitude indicates a site almost a degree further to the West. Moreover, the spot indicated by the latitude is actually further south than al-Bīrūnī's approved figure for Jayfūr! Unless Raverty was right in placing Parwān somewhere in the vicinity of the Hajigak Pass in Central Afghanistan, a theory in support of which there is no other evidence, we are obliged to admit that the co-ordinates for Parwān are not reckoned with that order of precision

which we have come to expect in the personal observations of the *Ustād*. Rather similar is the case of the figures for Bāmiyān, a place in which he certainly took an interest. The two great Buddha images which are still the wonder of this site were designated by the names of Khing But and Surkh But ('The Grey Buddha' and 'The Red Buddha') as early as the *Hudūd al-'Ālam*. 'Unṣurī, the court poet of Maḥmūd of Ghazna, actually wrote a romance about these idols, though its contents are likely to have had more folkloristic than archaeological value. Of this poem al-Bīrūnī had written an Arabic translation, as he had of the same author's poem *Wāmiq wa 'Adhrā'*, and his knowledge of the two figures appears in the *Qānūn* when he names them in Arabic as: **al-ṣanām al-aḥmar wal-akḥab. kul wāhid saba'ūna dhirā'an** 'The Red Idol and the Grey Idol, each of them being seventy cubits'. The smaller of the two figures is indeed 35 metres high, which would be equivalent to seventy cubits, and the larger over 50 metres, or 100 cubits. We may wonder whether the sage applied his mathematical skill to calculating the height of the smaller Buddha. The co-ordinates for this well known spot are given as **صبن لریه** which I convert according to my usual procedure as 66° 50' East by 34° 15' North. This location is nearly a degree too far west, but only about 20 miles south of the currently accepted position of Bāmiyān. While the latitude may be a personal observation, the discrepancy of longitude may result from its being based on dead reckoning during al-Bīrūnī's journey from Khwārizm, or it may have been a traditional figure taken from earlier books.

We may take next al-Bīrūnī's figures for the district of Nejrāb, the present-day Nejrāo. The *abiād* notation gives **صدیه لدم** which after conversion results in 68° 15' East by 34° 40' North. Granted that the district headquarters of Ghaznavid times was located near its present situation, the latitude is once more almost exact. On the other hand the longitude is almost a degree too low. Passing next to Lānghān, we find that the longitude given in the *Qānūn* **صوی** equivalent to 70° 10' East, is almost exact. However, this

time it is the latitude U.C. equivalent to 33° 50' North, which is implausible, being nearly 50' too low. Once again, this is a case where there are doubts whether the incorrect figure in the Qānūn is indeed the author's own. In the Indica a totally different latitude is quoted for Lānghān, 34° 43' North, and this is actually in agreement with the modern map. It is known from the Tahdīd (tr. Jamil Ali, p. 261) that al-Bīrūnī personally visited Lānghān on at least one occasion, in Dhū 'l-Qa'da A.H. 409, and observed there, at dawn, a solar eclipse. That he personally ascertained the latitude is all but certain, and the conflict of evidence between the Indica and the Qānūn thus especially puzzling. We must evidently assume that the latitude given in the Indica represents the author's intention, and his co-ordinates for Lānghān thus remarkably accurate.

It is valuable to have this assurance of our author's accuracy, before passing to his next station, probably that of the greatest archaeological interest. This is the settlement curtly noted in the Qānūn as Ribāṭ Kindī, al-ma'rūf bi-Ribāṭ al-Amīr 'The guard-house of Kindī, known as the guard-house of the Amīr'. The importance of this place is explained in a detailed historical source. It is the Adāb al-harb wal-shajā'a, a treatise on the art of war, written in the time of the Delhi Sultan Iltutmish (607/1210 to 633/1235) by a certain Muḥammad b. Maṣṣūr, known as Mubarakshāh and Fakhr-i Mudabbir. We are told in connexion with the celebrated defeat of the Kābulshāh Jaypāl by Maḥmūd near Peshāwar in 391/1000, the story of how the conqueror's father Sebuktegīn had previously defeated the same king in the plain of Kindī near Jalālābād, and built as a memorial of the battle the ribāṭ known as Amīr Kindī. The place became a famous resort of Muslim campaigners, and contributed to the fame of Sebuktegīn. The later Sultan Shihāb al-daula Mawdūd defeated the murderers of his father in the same district, and built a second ribāṭ which was known as Fathābād. From the archaeologist's viewpoint, if these two ribāṭs were built as memorials, they are likely to have been strongly constructed and splendidly decorated. In spite of the dire vicissitudes which were later to befall the Muslim monuments of

Afghanistan, there is every chance that remains of historical interest could still exist at these sites. There is thus special interest in seeking to determine their positions.

At this point the text of Fakhr-i Mudabbir, which I have been closely paraphrasing here, which I may perhaps be allowed to quote in the original Persian:

Īzīd — ta'ālā — ān pādīshāhān rā bi-āmūrzād kih dar 'ālam nīknāmī bi-guzāshtand; ū tā khishtī az ān bar jai ast, nām-i īshān zinda ast. Tā har kih pādīshāh bāshad chīzī pas az khud bi-guzārad, tā nām-i vay zinda bi-mānad.

'May God Most High grant forgiveness to those rulers who have left a fair reputation in the world; and as long as a single one of those bricks stands upon its foundations, their name is perpetuated. To the end that everyone that shall become a ruler shall leave some memorial of himself behind, so that his name shall be kept alive.'

Taking these words as my cue, I shall seek your permission to digress for a few minutes from my main theme, in order to mention two of the distinguished Muslim rulers whose patronage had supported al-Bīrūnī before his arrival in Ghazna; and to remind you also of the two very interesting buildings that are associated with these princes. One of these buildings is very well known to-day, and in fact may be reckoned the most famous Muslim monument of present-day Iran. The second, however, is to-day all but forgotten. Yet each of them bore an Arabic inscription which tells something of its story, and which shows how closely each was associated with the lifetime of the sage. There can be little doubt that our author personally visited both of these monuments. The definite evidence goes no further than this, yet we might be tempted to guess that owing to the unusual character and quality of the first of these buildings, and some special points which arise from both of the inscriptions, both could have had a closer connexion with the astronomer. For both the buildings were prominent towers, which even if not specially designed for an astronomical purpose, could have played a useful part in astronomical calculations. Moreover, since al-Bīrūnī was effectively the scientific adviser to each of the rulers at the time the buildings were erected, it could reasonably

be inferred that he played some part, at least, in their planning and supervision; and that something of the unique quality of the former building may be due to his genius. This question, however, is one that I must leave to my hearers to decide. My task here is merely to present the evidence.

The first building to which I refer is of course the famous Gunbad-i Qābūs (I use, for the moment, the Arabic spelling of the latter name), which stands at the township similarly named in Gurgan Province, Iran. As the illustration shows, the building is not actually a dome, as the name suggests, but a high, pointed tower. A tradition exists that it represents the tomb of the stern yet philosophically-inclined prince whose name it bears. Yet investigations of the structure in recent times have revealed no trace of a burial chamber; and the Arabic inscription which it bears, whether on account of the builder's stoical impeturbability, or simply by a statement of sheer fact, makes no explicit mention that its purpose was for a tomb. The short and elegantly carved Arabic inscription which it bears, drafted in rhyming prose, is exceedingly well known:

Hādihā 'l-qaṣru 'l 'ālī, li 'l-amīri Shamsi 'l-Ma'ālī
 al-amīru 'bnu 'l-amīr Qābūs ubnu Wushmgīr
 amara bi-binā'ihī fī ḥayātihi
 sannata saba' wa tisa'īna wa-thalāthami'ah qamariya
 wa-sannata khamṣa wa-saba'īna wa-thalāthami'ah shamsiyya.

'This elevated palace belongs to the amīr Shamsu 'l-Ma'ālī. The amīr who is son of the amīr, Qābūs son of Wushmgīr gave orders for the building of it during his lifetime, in the lunar year 397, and the solar year 375'.

There is only need here to mention three points. The appearance of the building is striking, and modern observers have been quick to remark on its strange, though quite accidental resemblance to a space vehicle. The fact that, as the late Professor Vladimir Minorsky has said

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this is 'the oldest architectural monument standing intact in Persia', is testimony to its unusually sound and robust design. Finally, the wording of the inscription is almost unique amongst the Islamic inscriptions of Iran in giving the date not only according to the Hijrī Era, but also according to the solar Zoroastrian Era of Yazdagird. The use of the latter is reminiscent of the practice of al-Bīrūnī at many points in his astronomical work, where he often gives a double dating both to fix the moment in time with the greatest precision, and to enable an astronomer to refer it to an almanac drawn up on the basis of a solar calendar. Furthermore, it should not be overlooked that the date given, 397/1006, fell in fact during the period when al-Bīrūnī resided at Jurjān, the capital city of Qābūs, of which the famous monument still helps to indicate the site.

By comparison with the tower of Qābūs, the second monument of which I have to speak is little known. It is a tower of which the remains are nearly, perhaps even totally destroyed to-day, and of which the former existence is revealed by a leaden plaque which is still to be seen in the Historical Museum at Tashkent. I owe my opportunity of studying it to a tour in Uzbekistan hospitably arranged by the Institute of Oriental Studies of the Academy of Sciences of the U.S.S.R. during June and July 1972, within the framework of their academic exchange programme with my own institution, the School of Oriental and African Studies, University of London. I am grateful to the authorities of the Museum for allowing a photograph to be taken, and to my guide and interpreter, Mr. Igor Klotchkoff, for making the arrangements on my behalf, and also allowing me to use a photograph taken by himself at the same time.

The Arabic inscription cast upon the plaque was first published in a pre-revolutionary Russian Orientalist journal, in a transcription that was very nearly correct (N. Katanov, 'Khorezmiiskaya svinstovaya plita, naǐdannaya v razvalinakh Kunya-Urgencha', Zapiski vostochnago otdyeleniya imperatorskago russkago arkheologicheskago obshchestva XIV,

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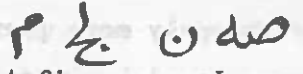
1900, 015-017). In the version which I give here, I have taken the opportunity to correct one or two minor misprints in the published reading:

Amara al-amīr al-sayyid al-malik al-'ādil Abu 'l-'Abbās Ma'mūn
bin Ma'mūn Khwārizmshāh bi-binā'i hādhihi 'l-manāra, wa haḍarahā
bi-nafsihi,
wa-tawallā waḍ'ā āsāsihā, tawādu'an li 'l-dīn wa-taqarraban ilā
'llāh ta'āla
dhikrahu, wa-ragabatan fī thawābi 'l-dārayn, wa dhālika fī shuhūrin
sannati ihḍā wa-arba' mi'ah.

'The amīr, the lord, the just prince Abu 'l-'Abbās Ma'mūn b. Ma'mūn Khwārizmshāh gave orders for the building of this tower; and he visited it in person, and supervised the laying of its foundations, in humility towards the faith, and seeking the favour of God, whose Mention is Exalted, and desiring his reward in both worlds. It happened in the year 401.'

Although, as at Gunbad-i Qābūs. the text does not explicitly connect the monument with al-Bīrūnī, there are several details which tend to suggest his participation. During the year in question, the astronomer was in fact living under the patronage of al-Ma'mūn, whose kindly treatment of him he mentions in several passages of the Tahdīd. No doubt he often advised the prince on scientific matters. The claim made by al-Ma'mūn to have personally visited the site of the tower, and even to have directed the laying of the foundations, is definitely unusual for an Islamic ruler. It not only suggests the scientific and technological interests for which al-Ma'mūn is well known, but also, of course, the intervention of the scientific advisers of the prince. The casting in lead of an Arabic inscription is in itself a remarkable procedure, a definite technical innovation, and I know of no other example of this kind. The close interest taken by the ruler suggests that the tower may have been planned to serve some technical purpose. Although the only specific observations mentioned in the Tahdīd relate to the year 407, and so did not directly follow the building of the tower, it is evident that a tower

of known height and position could have served many functions in Abū Rayhān's astronomical and geographical calculations.

Returning once more to Ribāṭ Kindī, the association of that still undiscovered monument with the greatest of Muslim scientists is of course less immediate. It had ^{been} built in the reign of Sebuktegīn, at least 22 years before his visit to the area, and although the monument to his father's memory may have been embellished by Maḥmūd during one of his expeditions down the Kabul River valley with al-Bīrūnī in his train, the astronomer was not likely to have exercised sufficient influence at that time to have played a leading rôle in the planning of any such works. None the less, its mention in the Qānūn suggests that Abū Rayhān was familiar with the place, and he may well have lodged there during one of his journeys through the district, especially since there is unquestionable evidence in the Tahdīd that he was active a few miles away in Lānghān. I was therefore eager to ascertain whether the remains could be located from his co-ordinates, which are printed as . As in earlier cases, I convert these into current figures as Long. 69° 40' East by Lat. 33° 40' North. In the Indica, however, the latitude is given as 33° 55'.

During my stay in Kabul in 1969, during the days which followed my visit to Sakāvand, I spent several days, in the company of the Institute representative Mr. Aram, in scouring the western fringes of the Logar Valley in the general vicinity of this plot, but entirely without result. Some days later, when I happened to discuss the problem with the well known scholar at Kabul, Professor 'Abdul Hai Ḥabībī, he called my attention to the very interesting fact that the present-day map records a village named Kindibagh, not indeed within the confines of the Logar, but well below the Lattaband escarpment on the fringe of the Jalālābād Plain, and about ten miles south of Jalālābād itself. I have had no opportunity to visit Kindibagh, and have no means of ascertaining whether the spot is marked by the remains of a Ghaznavid ribāṭ. At first sight the place seems a suitable location for the famous battle in which

Sebuktegīn fell upon the army of the Kābulshāh Jayapāla, as narrated by al-'Utbī. Yet, if this identification should prove correct both the latitude and the longitude given in the Qānūn are nearly a degree too low. What can be the explanation for such a discrepancy? It could be argued that al-Bīrūnī made no observations for this locality, and that the figures are based on no more than dead reckoning for the overland journey, a circuitous route in mountainous country; or even from rough and ready itineraries used by the Ghaznavid administration. Yet no final verdict on this question is possible until the remains of Ribāṭ Kindī have been definitely found.

The next site noticed in the Qānūn is Dūnpūr or Dīnpūr. The co-ordinates given are $صوكه$ ٤٥ ٣٣ , converted as Long. $70^{\circ} 25'$ East by Lat. $33^{\circ} 45'$ North. The last figure, like that given for Kindī in the Qānūn, is obviously too far to the South. But in any case, there is once more evidence that it was not al-Bīrūnī's authentic figure for the latitude of Dūnpūr, specifically quoted in the Indica as $34^{\circ} 20'$ North, which is obviously more plausible. With this evident correction, the co-ordinates seem nearly correct for Kindībāgh! The possibility must be considered that the names in the list have been disarranged, that the figures quoted are those for Ribāṭ Kindī, and that those for Dūnpūr have been omitted. However, there is other evidence for the position of Dūnpūr. In the Hudūd al-'Ālam (p. 92) it is said to stand 'opposite' to Lānghān on the bank of a river. It is thus identified with the town of Adīnpūr mentioned in the Bāburnāma, which was then the governor's residence of Ningrahār, 13 farsakhs east of Kabul by a poor road, and on the northern bank of the Surkhrūd River. It is vividly described by the Emperor Bābur as standing on an isolated hill, its southern cliff falling directly into the river, and detached from, but backed by, the spur of the Siyāh Kūh range. Such a site for Adīnpūr should be immediately obvious to any traveller passing upstream along the Surkhāb River from the direction of Jalālābād. Yet if this identification for Dūnpūr should be proved correct, it gives rise to another awkward difficulty.

According to the figures given in the Qānūn, Kindī lies $45'$ west of Dūnpūr. Al-Bīrūnī's own conversion tables given in the Tahdīd (tr. Jamil Ali, p. 182) reckon the linear equivalent at a little above 42 miles. Yet if it is ultimately confirmed that Kindī is identical with Kindībāgh, and Dūnpūr with Adīnpūr, the first of these places is 20 miles east of the second. It is difficult to charge the Master Astronomer with so obvious a discrepancy. We have already considered the possibility that names and figures in the manuscript have been transposed at this point. This explanation would certainly provide one way out of the difficulty. On the other hand, plausible as these identifications are, they have not yet been checked by observations on the ground. It is possible that one or other might prove illusory, and that Ribāṭ Kindī is indeed near the spot which the co-ordinates suggest, in Khugiani country along the upper waters of the Surkhāb stream, near the passes which lead west into the Logar Valley.

Thus we reach the final stage in this part of Abū Rayhān's itinerary, the city of Peshawar itself. Here we find simultaneous proof of our author's accuracy, and at the same time the problem of a discrepancy. The figures given in the Qānūn are $صري$ ٣٥ ٧١ . Conversion on the basis adopted for this paper gives the result Long. $71^{\circ} 25'$ East by Lat. $35^{\circ} 35'$ North. Since the modern co-ordinates are Long. $71^{\circ} 31'$ East by Lat. $34^{\circ} 01'$ North we see that the first figure is almost exact, and being within $4'$, or a little over 3 miles from the true location, would (in the case of an unknown site) be amply sufficient to guide an archaeologist. The second figure, that of latitude, remains puzzling. As quoted in the Qānūn it is $33^{\circ} 35'$ North, which is nearly $25'$ south of the present position of Peshawar, a rather large margin of error. At the same time, it disagrees with the latitude for Peshawar given in the Indica, where it is $34^{\circ} 44'$ North, actually $43'$ too far North. It is not possible to rule out all possibility of errors by al-Bīrūnī in the tables of the Qānūn. As he says in the Tahdīd:

The following examples will serve as guides to the calculator and as aids for formulation and investigation. I do not feel secure against the occurrence of slips in the calculations, because of the intensity of my worries. God is the best guide to the truth!

In the case of Peshawar, there is, however, one other very interesting possibility. We may consider whether discrepant figures in the Indica and in the Qānūn could not have resulted from observations made at different times. As we know from the anecdote of observations made at Jayfūr, al-Bīrūnī often had to use makeshift instruments which did not give results of minute precision. If therefore we take the average of the two figures given for Peshawar, Lat. $33^{\circ} 35'$ North and $34^{\circ} 44'$ North respectively, the result is $34^{\circ} 09'$ North, which is 8 minutes north of the actual site, or a little over 7 miles. This is a far more satisfactory conclusion, and it is possible that this explanation is a valid one. The present speaker has had no opportunity, during the preparation of this paper, to check the latitudes of all 11 places of which the author gives latitudes in the Indica against those quoted in the Qānūn to see whether the same explanation holds also for them. An astronomer too would be needed to verify the method by which al-Bīrūnī calculated his latitudes, and ascertain whether some of the errors could not have arisen from the use of inadequate almanacs current in his time, and the faults of which he constantly had to criticise. A hearer more fully versed in astronomical theory may be able to deduce the precise source of some of the minor discrepancies occurring in the tables of the Qānūn, and could therefore hope to arrive at the correct location of unknown sites. As you will observe, I am here making no attempt to check the locations of places visited by al-Bīrūnī in Pakistan. No doubt this is a task being undertaken by local scholars.

Before I sum up, it seems of interest to mention two other obscure places, each of historical interest, located by al-Bīrūnī. One of these is the locality called Karūr, which he places in Long. $69^{\circ} 15'$

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East, Lat. 32° North. The place is mentioned again in the Ādāb al-harb wa 'l-shajā'a, where it is named as the source of a particular type of bow used in hunting, and also in the tale of a wounded soldier who travelled there from Multan. The co-ordinates fix the position in the valley of the River Gomāl about 30 miles S.W. of Wana, and not far from the Durand Line. I shall have to depend on members of the audience to tell me whether such an archaeological site exists in that area.

The second place of interest mentioned by the Qānūn in the same general area is Farmul, placed by al-Bīrūnī in لبیه صدله. Conversion to the modern base yields Long. $68^{\circ} 35'$ East by $32^{\circ} 15'$ North, a plot on the upper valley of the Gomāl River about 30 miles south of present-day Urgun. The tribal name Farmuli is fairly prominent during political events of the Sultanate of Shēr Shāh, and was in fact identified by Elphinstone (An account of the kingdom of Kabul II, 158) as that of a Tajik group at Urgun itself. It would be interesting to know whether the name is one that still occurs to-day.

In my paper I have tried to explore, with mixed success, some of the co-ordinates given by Abū Rayhān for localities in Afghanistan and along its borders. We can be sure that the greatest of Muslim scientists knew these lands, so close to his home at Ghazna, better than geographers usually do to-day. That there are some errors in the figures given in his lists has always been assumed, but I have tried to show that when he fixes the positions on his personal authority, many of the results show a high degree of precision. Such results can be valuable to the archaeologist who seeks the unidentified ancient sites of the Afghan border, though several puzzling difficulties still remain. Sometimes our author contradicts himself in different passages, and sometimes we can locate his stations on the ground. Perhaps the most interesting of all the sites is Ribāḥ Kindī, scene of the victory of Sebuktegīn over Jayapāla, which has still to be found. Of interest too are the parallels between al-Bīrūnī's tables, and the anecdotes in the Ādāb al-harb. Both may occasionally reflect al-Bīrūnī's lost Kitāb ta'rīkh

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