The Bhuj earthquake of 26 January 2001 in Gujarat and a number of articles written after the event prompted this note. It looks at a number of earthquakes, which I found when I was reappraising the seismicity of the Middle East, some of them known but mislocated, and others little known or misinterpreted.

28 Dec 893 Daibul

Modern writers, particularly those writing after the Bhuj earthquake note a destructive earthquake in AD 893 on the Indus Delta. Tracing back the information about this event, I find that it is Hoff1, and after him Mallet2 who first, on the authority of a 13th Century Syrian writer, Bar Hebraeus, say that a shock in 893 killed 180,000 people and destroyed a capital city in India, the name of which they do not give. Bar Hebraeus says that ‘...in 280 aH (anno Hijri) or 23 March 893 to March 894, there was a terrible earthquake and a great city in Outer India fell down, and 150,000 men were dragged from under the dust of the houses which had been thrown down, and were buried...’.

Oldham takes up this information and places this earthquake in India, quoting as supporting evidence Ibn al Alihar and later Arab writers who name the capital city as Dabil, but who do not say where the city was. Oldham realized that a place of this name could have been in Armenia but, without specifying its location, he places Daibul in India3.

Oldham is followed by later writers who place Daibul between Tatta and Karachi1, while modern writers even assign to Daibul a tentativeness of VIII-X (MM)4, an early site on the Indus Delta, which has not yet been identified5,6. Various locations of Daibul have been proposed by Williams7, Cunningham8 and Rajendra and Rajendran9, while early European navigation maps show also Daibhol or Dabil between Goa and Bombay, at 17.60°N–73.17°E, 870 km from Tatta10.

However, this information is not really pertinent in this note. What we are interested in here is not to locate the site(s) of Daibul, but rather to identify the town which was destroyed by an earthquake in AD 893.

More information about this earthquake which I found in contemporary Armenian documents and marginal notes shows that it happened at Dvin or Dabil in Armenia, in the night of 15 Shawwal 280 aH (28 December 893)11-16. Full accounts of the earthquake are in al-Tabari and Ibn al-Jauzi, who accurately date the lunar eclipse on 27 December 893 that preceded the earthquake and describe the event in some detail16-18.

The area worst affected was that of the city of Dvin (40.02°N, 44.58°E) and its immediate surroundings, which had already suffered considerable damage in an earthquake 30 years before. All but about 100 houses in Dvin were destroyed, together with the metropolitan church and palace of the Catholicos, and 30,000 people were killed in the city. Damage extended over the plateau of Artashat where landslides added to the destruction, and Grigor, Bishop of R‘ts’shunik and some of his followers who happened to be in retreat in the mountains, perished. This was a locally destructive earthquake affecting a rather small but densely populated region. Shocked occurred for five more days, adding to the damage.

It seems unlikely that Bar Hebraeus, the only writer who mentions India, could have read his source so uncertainly as to misplace the earthquake. On the other hand, he says that the event happened in ‘Outer India’, which may be taken to mean near the borders of India, or towards India, to the east from where he was writing. However, the source of his statement must remain, at present, obscure.

Although details of this event are quite clear, many and various errors of location have been associated with it. The main problem of modern writers has been to identify Dabil, which is the Arabic for Dvin and Duvin in Armenian19; errors that must be the result of lack of familiarity with the geography of the Middle East rather than a misunderstanding of the true place involved in Armenia.

Recently, after the Bhuj earthquake of 2001, age data of liquefaction features at Vigakot (24.20°N–69.15°E), 130 km southeast of Tatta give calibrated ages of AD 875–1035, suggesting an earthquake during that period20,21, that may well have happened, but which could not have been the earthquake of 893 at Dabil in Armenia.

1664 Bangla

An earthquake, sometime between 1663 and 1664, caused considerable damage to settlements in Bengal.

The earthquake is noticed by Berryat, who dates it to 1664, and says that shocks which lasted for 32 days caused the bottom of a lake at a place, seven days journey (c. 140 km) from Dacca (25.0–90.0) to rise, as a result of which the lake dried up; he does not quote his source of information22. This information is repeated by Hoff1, and Mallet2. Oldham3 and Bapat et al.23, who place the earthquake at Dacca.

Original information about this event can be found in a letter from Ballasore, written on 6 January 1665/6 which says that, ‘...We have had several earthquakes unusual here, which, with hideous noise have in several places, swallowed up houses and towns; but about 7 days journey from Dacca, where were at that time three or four Dutch, they and the natives, relate this story. That in that place the earth trembled, about 32 days and nights without intermission; at the latter end, in the marketplace, the ground turned round as dust in a whirlwind, and so continued several days and nights, and swallowed up several men, who were spectators, who sunk and turned round with the earth, as in a quagmire; at last the earth worked up, and cast up a great fish, bigger than that has been seen in this country, which the people caught; but the conclusion of all was that the earth sunk with 300 houses, and all the men, where now appears a large lake, some fathoms deep. About a mile from this town was a great lake full of fish which in these 32 days of the earthquake, cast up all the fish on dry land, where might have been gathered many, which had run out of the water upon dry land.
Observe that the great earthquake of 12 May 1668 respec-

tively. Musta’id’s account clearly implies that the earth-
quake did not damage Tatta and Lahori or, had these places been 
affected, damage should have been small, not worth re-
porting. Consequently, if Samawani was located on the Indus Delta, and Tatta and Lahori were not affected, the magni-
tude of the earthquake should have been relatively small. The ‘sinking’ of Samawani probably suggests liquefaction and slumping of the ground, not uncommon in this region that happens even without the help from earthquakes.

The assumption that the earthquake should have been small is supported by the observation that there is no evidence of damage in Ahmedabad, east of Tatta. The mosques of Masjid-Nagira and their minarets built in 1519, that which Sidi Saiyjd built in 1573, the 21 m-high shak-
ing minarets next to the Sidi Basjir mosque, and the Jumma Masjid built in 1424, stand intact. The exception are the two minarets of the Jumma Masjid, which were destroyed in the earthquake of 1517.

Attempts to retrieve additional information from contemporary sources, so far, proved fruitless. The Indus Delta in the 17th Century was far removed from the coastal areas frequented by European traders, chiefly Portuguese and British. The nearest trading centres from which information could have survived in un-
published correspondence were in the Gulf of Cambay at Diu since 1517, at Surat since 1612, at Daman 1530, and fur-
ther south at Bassein since 1534, more than 800 km from the Delta.

Conclusions

I show that the 893 earthquake did not occur in the Indus Delta, that the 1664 earthquake probably was associated with the Shillong Plateau and that the earth-
quake of 1668 in the Indus Delta was a relatively small event.

Recent papers on the Bhuj earthquake refer to a large earthquake, which alle-
gedly occurred in Tatta in 1668, not far from Bhuj, to which the US Geological
Survey Earthquake Data Base assigns a magnitude of 7.6. The spurious 893 earthquake and the Bhuj and Allah Bund earthquakes of 2001 and 1819 have lead scientists to postulate an episodic tectonic evolution of the region with a return period of 170 years for large events.

The problem with historical seismicity is that recent years have seen a proliferation of earthquake catalogues with data from one catalogue being absorbed by the next. The single most common failing in this generation of regional and global catalogues has been that few of them are based on original sources of information and most rely on secondary evidence and a slavish repetition of previous lists, errors and all.

It may be that too much effort has been diverted from the retrieval and interpretation of original data from different languages to computer processing of second-hand information, to the extent that the tidying up of input data into a reliable and homogeneous body of information is essential.

12. Baloch, 1952

ACKNOWLEDGEMENTS I thank Dr Mubarak Ali, Lahore for drawing my attention to local sources regarding the early geography of the Thatta–Daibul region.

N. N. Ambraseys is in the Imperial College, London, SW7 2BU, UK e-mail: n.ambraseys@imperial.ac.uk