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ON THE SEISMICITY OF SOUTH-WEST ASIA

Data from a XV Century Arabic Manuscript

by Dr. N. N. AMBRASEYS

Lecturer, Imperial College of Science, University of London

Lieutenant Baird Smith in a letter to the Asiatic Society of Bengal in 1842 called attention to an earthquake catalogue written in the xv century by Jelal'ed'din As-Soyuti, an Egyptian polygrapher, probably the most prolific writer in the Mamluk period, and perhaps in Arabic literature.¹

A year later, an abridged translation of this catalogue was published in the Journal of the Society. This translation was made by A. Sprenger from an Arabic MS of the Bibliothèque Nationale de Paris², and it seems that this is the original of As-Soyuti's work on earthquakes whose Persian translation Baird Smith was aware of and which lead him to his search for the originals.

Both, the MS-catalogue and Sprenger's translation of As-Soyuti's work remained unknown to the seismologists until recently. In 1928, Willis in a paper to the Seismological Society of America, on the seismicity of the Middle East, made reference to Sprenger's translation, but as far as we know, As-Soyuti's catalogue was not used by other seismologists.

As-Soyuti's catalogue came to our notice recently when, checking a few suspect entries in Willis's catalogue against the quoted original authorities, As-Soyuti's was one of them. A comparison of the catalogues showed that due to an oversight Willis had dated all entries made on As-Soyuti's authority by

¹ The very long list of his writings compiled by Flügel (1832) gives 561 works, but it includes memoirs, quite short treatises, in addition to substantial works. Cf. Wiener Jahrbuch, Vol. 58-60.

² Fonds Asselin Nr. 218 (Probably Nr. 4658 and 4659). Cf. Brockelman (1938)

as much as six centuries too early¹. An examination of Sprenger's translation on the other hand showed that certain seismic events which were quoted by orientalists on the authority of As-Soyuti's work on earthquakes² were missing from his translation. This together with the fact that the translation contained a number of obvious misprints which we were in a position to check and that it was made in a form of a hasty memorandum from a MS which, Sprenger agrees, was neither very correct nor legible, made it necessary for us to resort for authentic information to the original MS of As-Soyuti's work.

His work on earthquakes called "Kashf as-salsalah'an wasf az-zalzala" i.e. "Describing earthquakes without their din" was compiled, most probably, after 1499 and before 1505 A.D.³ Copies of this work are kept in a number of libraries⁴ and the MS which we used is that of the British Museum (Or.5872).

The MS consists of 45 folios⁵ measuring 17 × 18 cm. while the size of the written text is (2) × 13 × 17 cm. Each page has in two columns 30 extremely regular lines. The text begins on folio 2a. Folios 2a to 17b contain a number of traditions showing that earthquakes are ordained by God to punish men for their sins. At the same time As-Soyuti wishes to console his countrymen by showing them from history, that much more frightful punishments of this kind had occurred than the one under which they suffered in his time. Apparently he wrote this work on the occa-

¹ Sprenger in his translation did not attempt to convert into A.D. the Muslim dates which accompanied each event in As-Soyuti's catalogue, with the result that when his translation was published, all events were dated in the Muslim Calendar. Sprenger indicated this in the beginning of his translation, that years must be taken after the Hijra which is the migration of Muhammad from Mecca to Medina, and which took place in the Arab year beginning 16 July 622 A.D. It seems that Willis did not notice that Sprenger was dating As-Soyuti's list in the Muslim Calendar and apparently confused A.H. with A.D. As a result of this thirty entries in his list which were made on the authority of As-Soyuti are dated over six centuries too early. Willis's list was used by Sieberg (1932a; pp. 794, 801, 806; 1932b; pp. 182, 188, 192, 198, 199) and others, without checking the mistake, with the effect that many earthquake catalogues and seismicity charts now contain quite a large number of non-existent events. Cf. Ambraseys (1961).

² Professor Schaefer gives an earthquake on the authority of As-Soyuti's work at Kerak for the year A.H. 867. Cf. Richter (1883), (1939), and Baratta (1903).

³ As-Soyuti died in A.H. 911 and the last entry in his catalogue is for an earthquake in Egypt on the 27th of Dhu'l-Hija 905 A.H., that is for the 24th of July 1500. Cf. Brockelmann (1934).

⁴ Cf. Brockelmann (1938).

⁵ In fact 47 folios; folios 4 and 13 are numbered twice.

sion of an earthquake in Egypt. Folios 18a to 44b contain a list of earthquakes which took place in Asia and Africa during the period 628 to 1500 A.D.

The number of original sources at the disposal of As-Soyuti should have been considerable. He very often refers to the works of Ahmad ibn-Fadlan ibn-Hammad, Abu-Ja'far Muhammad ibn-Musa al-Khuwarizmi, Izz-al-Din ibn-al-Athir, Tagi-al-Din Ahmad Maqrizi, Ibn u'l Jauzi, Ad Dahabi, Abu-Shamah Qarmati, Al Hafez Ibn Asakhr¹, Abu-Bakr al-Nahas, Al Wadari, Ibn Garir Saheb al Meraah, Hafiz Ibn Hagarh, Ibn al-Walid al Sheghnah, An'al Matwag, Emam Abu-Kassin al-Rafia, from which he often transcribes or summarises whole paragraphs².

As a rule, As-Soyuti is not prepared to give the exact dates on which the various earthquakes that he records had occurred. This becomes apparent when in summarising from sources which give a detailed account, he drops, among other things, the month and day of the event, and reports only the year. As a result of this, As-Soyuti in most cases treats the seismicity of a whole Muslim year collectively and enters it in his catalogue as the result of one earthquake, while in fact the seismicity he reports represents the accumulative effects of a number of distinct earthquakes which occurred during the year at different places. This attitude of early chroniclers to report collectively seismic events has been overlooked by many seismologists, who also not allowing for the natural exaggerations in early statements, overrate the magnitude and destructiveness of the earthquakes of old.

So far as we know, the data in As-Soyuti's catalogue, though not complete, is extremely trustworthy. Its concurrence with the information of the original authorities As-Soyuti quotes, as well as with that from independent sources of information, such as of Byzantine and Latino-Roman origin³, is remarkable. This we can claim, with some justification, of the information contained in the MS Or.5872, and although it is rather improbable that other MSS should differ in content, it is possible that certain lacunae or additions may exist. For instance, Sprenger's translation shows that not all our differences could be accounted for as due to mis-

¹ From As-Soyuti we learn that this author has written a monograph on earthquakes, but we have not been able to trace this reference.

² Some of these writers are unknown to us and are not mentioned either in Brockelmann or in Mustafa ibn-Abdallah.

³ Writers in the Corpus Scriptorum Historiae Bizantinae. Also Sathas (1870 et seq.); Writers in the Biblioteca Bio-Bibliografica della Terra Santa e dell'Oriente Franceseano.

prints in his translation or as deliberate omissions on his part. Unfortunately, we have not been able to check Or.5872 against the Paris or any other MS of As-Soyuti's work.

This note was written in order to present the valuable data in As-Soyuti's catalogue of earthquakes to the seismologist rather than to the orientalist. The information in As-Soyuti's catalogue will most certainly be proved of some help in appraising the seismicity and delineating the seismic regionalisation of certain sparsely populated and otherwise seismically undocumented regions of the East.

In this note was omitted As-Soyuti's views on earthquakes which though now palpably absurd are of some antiquarian interest (Folios 2a to 17b), and concentrated on his catalogue. This part of the MS we rendered in a rather condensed form, in some instances paraphrasing the text to make it readily legible, but maintained all the information contained therein which we considered to be of value to the modern seismologist and earthquake engineer. In this I received great assistance from Mr. Aziz Kamel Girgis, B.Sc., D.I.C. of the Roads and Bridges Dept. U.A.R.

We had some difficulty with MS toponymics. Toponymics mentioned in the MS have during historical times suffered many changes. Also place names quoted in the text without any reference to their approximate location, necessitated resorting to the original authorities, since very often more than two towns or regions in different parts of Asia had the same name. The map attached to this paper and Appendix (I) may prove helpful in locating such places. In general we tried to maintain toponymics of today, although the spelling may be different in different Atlases.

NOTE: Entries marked with one asterisk do not appear in Sprenger's translation; two asterisks indicate that the information in Sprenger's text is incomplete. Dates in brackets refer to the Muslim Calendar. Figures in brackets refer to Appendix (I).

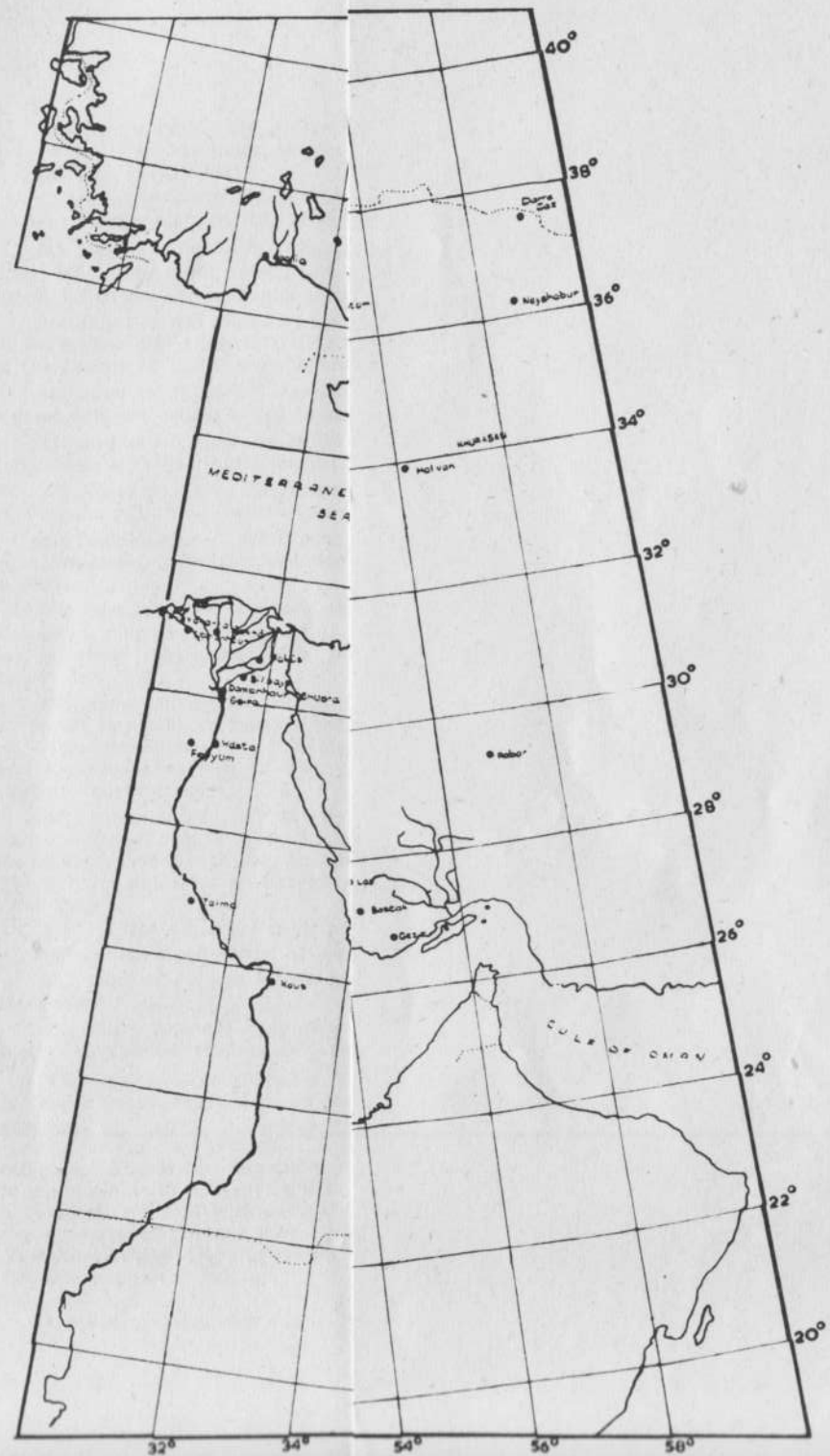
628 May 11 — 629 April 30 (AH 7)*: An earthquake in Arabia at Hijaz. (Fol. 18ab)

640 December 21 — 641 December 9 (AH 20)*: An earthquake in Arabia at Medina where the walls of the city were badly shaken. (Fol. 19a)

713 March 20 (AH 94 Adar 20): In Syria it lasted 40 days and many buildings were damaged. Antiochia was completely destroyed. (Fol. 19b)

716 August 25 — 717 August 13 (AH 98): Syria was shaken again for 40 days and Antiochia was badly damaged.

747 September 11 — 748 August 30 (AH 130): A violent shock in Damascus which obliged the people to leave town.



748 August 31 — 749 August 19 (AH 131)**: Several new shocks in Damascus. The first shock damaged the mosque, and those which followed destroyed it. (Fol. 20a)

796 March 16 — 797 March 4 (AH 180): A very strong shock in Alexandria felt all over Egypt. The top of the lighthouse in Alexandria was destroyed.

802 December 30 — 803 December 19 (AH 387): An earthquake which shook Misis¹, its walls were badly damaged, part of which collapsed. The shocks lasted for one hour and then followed an inundation (of the sea?).

818 July 9 — 819 June 27 (AH 203): An earthquake in Iran at Khurasan. At Wazirabad (22) it lasted 70 days and the mosque together with one quarter of the houses at Balkh were destroyed.

834 January 16 — 835 January 4 (AH 619): Strong earthquakes with a great darkness which lasted from noon until the evening.

835 January 5 — December 25 (AH 220): An earthquake which lasted forty days destroyed Antiochia. (Fol. 20b)

838 November 23 — 839 November 11 (AH 224): 15,000 persons perished at Fergana (23) by a catastrophic earthquake.

839 November 12 — 840 October 30 (AH 225): At Ahvaz in Iran an earthquake shattered mountains, it lasted sixteen days and was felt as far as Jebbe in Syria.

844 September 18 — 845 September 6 (AH 230)¹: An earthquake at Damascus, many perished under the ruins. The shock extended to Antiochia and Harirah destroying both places killing 50,000 persons. It shook Mosul also.

846 August 28 — 847 August 16 (AH 232): Earthquakes that shook all the world, in particular Libya, Tunisia, Algeria, Syria. The walls of Antiochia and Hims were destroyed. Gezir and Mosul were also destroyed. Antiochia and El-Awassim as well as other capitals were shaken for several days and were severely damaged.

847 November 24 (AH 233 Rabi-ii, 11)**: Damascus was shaken by a very strong earthquake. The El-Aamer mosque was destroyed together with its minarets. Many houses, barrages and irrigation ditches were destroyed. The damage extended to Darayya (2), El-Mazar, Beit-Liqya and El-Sowth. (Fol. 21a)

848 August 5 — 849 July 26 (AH 234): An earthquake at Herat in Afganistan destroyed many houses.

853 June 12 — 854 June 1 (AH 239): At Tiberias after an earthquake the ground sunk.

854 June 2 — 855 May 21 (AH 240): An earthquake in Tunis which destroyed thirteen villages at Kairouan (3) where the ground sunk.

856 December 3 — December 30 (AH 242 Sha'ban): Violent earthquakes. In Tunis about 45,000 persons were buried under the ruins. The shaking extended to Yemen, Khurasan region, Syria, Fars region, Bastam, Qom, Kashan, Shahr-Rey, Damghan, Ghirgan, Neyshabur, Taberistan, Esfahan and other places in Iran. Mountains were shattered, and the ground opened up in many places so extensively that it could easily swallow a man. In Yemen a mountain covered with cultivated land moved from its place and became the property of another tribe. Five stones fell from heaven in the village El-Suhd in Egypt; one of them, ten pounds of weight fell on the tent of a Bedouin and set it on fire.

¹ Sprenger gives (AH 233). Not found in Or.5872.

859 April 8 — 860 March 27 (AH 245): Earthquakes over the whole world. At Antiochia the walls of the city were destroyed, and many parts of it sunk into the ground and disappeared. Many bridges and villages were destroyed, and a mountain covered with 90 villages fell into the sea carrying with it 1,500 houses¹. The river disappeared one parasang's (26) distance. The earthquake extended to Raqqa, Harran (4), Ras el'Ain, Hims (5), Urfa (6), Damascus, Tarsus, Misis, and Adina. In Egypt dreadful noises were heard and many perished. In Mecca springs sunk. The shock shattered mountains on the shore of Syria, in Latakia. El-Son was overwhelmed, and mountains moved with their inhabitants. The shock then crossed the Euphrates and was felt in the Khurasan region. (Fol. 21b)

864 January 15 — February 12 (AH 249 Dhu'l-Hijja): At Shahr-Rey a violent earthquake destroyed many houses; its inhabitants fled into the country. (Fol. 22a)

871 November 18 — 872 November 6 (AH 258): Wasit on the Tigris was shaken and 20,000 persons perished under their houses. (Fol. 22b)

881 September 29 — October 27 (AH 268 Rabi-I): An earthquake at Baghdad.

893 March 23 — 894 March 12 (AH 280)**: In Iran at Ardabil six earthquakes occurred during this period; the result of this was that 150,000 persons perished. One of these earthquakes occurred between December 14, 893 and January 11, 894 at the town of Ardabil and it was preceded by an eclipse of the moon, darkness and wind.

900 December 26 — 981 December 15 (AH 288): An earthquake at Ardabil which lasted for a few days. (Fol. 23a)

902 June 11 — July 10 (AH 289 Rajab): An earthquake at Baghdad and Basra where many places sunk into the ground.

912 August 18 — 913 August 6 (AH 300)**: At Dainawar (7) an earthquake shattered a mountain from which streams of water gushed out which submerged many villages. Seven years later a star split into three pieces and this was followed by a frightful noise. (Fol. 23b)

942 September 15 — 943 September 3 (AH 331): At Ladnesa (8) an earthquake destroyed many buildings and many persons perished.

955 April 27 — 956 April 14 (AH 344): Egypt was shaken by an earthquake for three hours; it caused great damage, and many houses collapsed.

956 April 15 — 957 April 3 (AH 345): An earthquake shook Iran. At Hamadan many lives were lost, and many houses collapsed.

957 April 4 — 958 March 24 (AH 346): An earthquake in Iran. At Shahr-Rey and about that town it lasted forty days, then it discontinued for sometime, but it again returned. The earthquake extended to Afganistan; at Taliq-an (24) in particular. At Shahr-Rey 150 settlements sunk into the ground, and a mountain sunk and an enormous chasm opened from which water and smoke gushed out.

958 March 25 — 959 March 13 (AH 347): An earthquake in Iran; Qom and Halvan (25) suffered. It extended to Kaman in Turkey, Baghdad and Jeble in Syria. At the same time Baghdad was shaken by another earthquake. Egypt was repeatedly shaken within the space of six months. (Fol. 24a)

972 October 12 — 973 October 1 (AH 362)**: An earthquake in Syria. Antiochia was damaged and many castles were ruined.

¹ Sprenger gives 1005 houses.

973 October 2 — 974 September 20 (AH 363): An earthquake at Wasit (9).

977 August 19 — 978 August 8 (AH 367)*: Baghdad was shaken several times. (Fol. 24b)

986 May 13 — 987 May 2 (AH 376)**: An earthquake at Mosul which destroyed many buildings and many perished under the ruins.

996 January 25 — 1020 April 26 (AH 386-411): During this period many earthquakes occurred in Egypt.

1002 November 10 — 1003 October 29 (AH 393): An earthquake in Syria the Greek frontier and at Abasim. Many castles and houses were destroyed; the shock extended to the capitals and the ports of these regions.

1008 April 11 — May 9 (AH 398 Sha'ban): An earthquake at Dainawar did great damage; 16,000 persons perished under the ruins; in many places the ground opened up in great cracks. At Shiraz an inundation occurred and many ships were wrecked at sea.

1033 November 26 — 1034 November 16 (AH 425)**: Many earthquakes took place during this year. In Syria one-third of Ramla was destroyed. The walls of Jerusalem collapsed and the Temple was severely damaged. The mosque and its minarets at El-Gaalan at Gaza were destroyed and the upper part of the lighthouse of Gaza was badly damaged. Half the city of Nablus fell down and many villages in El-Badan were swallowed up in the ground and disappeared. In Egypt also the earthquakes caused much damage. (Fol. 25b)

1042 August 21 — 1043 August 9 (AH 434): An earthquake in Iran. At Tabriz the castle and the walls of the city were destroyed and 40,000 persons perished. The same happened at Palmyra and (Ba'albek) by another earthquake.

1046 July 8 — 1047 June 27 (AH 438): An earthquake destroyed the fortress at Qalat. The same happened at Diyarbakir.

1052 May 3 — 1053 April 22 (AH 444)**: A destructive earthquake at Urgan (10) and Ahvaz.

1058 September 23 — October 21 (AH 450 Sha'ban)**: Baghdad was shaken by an earthquake which extended to Hamadan, Wasit, 'Anah, and Tikrit.

1063 July 30 — August 27 (AH 455 Sha'ban): A strong earthquake in Syria. The walls of Tripolis were destroyed; the damage extended to Antiochia, Latakia, Akka, Tyre and Wasit. (Fol. 26a)

1066 March 31 — April 29 (AH 458 Jumada-II): A catastrophic earthquake in Iran. At Khurasan mountains split; hills were cleft. The shock overturned towns together with their inhabitants, and it levelled them with the ground. Very few people escaped. Most buildings were destroyed and it was impossible to ascertain the number of those who perished.

1068 March 18 (AH 460 Jumada-I, 11): A catastrophic earthquake in Palestine. Ramla was destroyed; only two houses remained and 25,000 persons perished. The shock extended to Jerusalem where the dome of the Rock (11) opened up but it closed back again. At Wadi-Qorha and Kufah much damage was done. The earthquake then extended to Arabia. At Tayma the ground opened up and Ha'il was destroyed. At Hijaz the shock damaged the panels of the mosque. It extended to Wadi As-Safra, Khaybar, Badhr, and Tabuk. Sharm Yanbu was also shaken. The sea retired from the coast one day's march, but soon returned again into its place. In all these places the shock was felt at the same hour. (Fol. 26b)

1070 February 25 (AH 462 Jumada-I, 11): An earthquake at Ramla and its dependencies. Egypt was also shaken and a corner of the principal

mosque of Cairo gave way. The shock was felt in Jerusalem and it was immediately followed by other earthquakes; two of which, in the same day.

1071 September 29 — 1072 September 16 (AH 464): Baghdad was shaken six times during one earthquake. (Fol. 27a)

1085 April 29 — May 28 (AH 478 Muharram): An earthquake which destroyed many Greeks at Erzerum.

1086 April 18 — 1087 April 7 (AH 479): During this period many earthquakes occurred and many buildings were destroyed in Iraq, Syria and Mesopotamia¹.

1114 June 7 — 1115 May 26 (AH 508)**: Thirteen settlements around Urfa were destroyed and the walls of Harran in Turkey collapsed. Samsat was completely destroyed and many Greeks perished. Also in El-Sun about 100 houses and one-half of the fortress were destroyed.

1117 May 5 — 1118 April 23 (AH 511): Baghdad was shaken by an earthquake.

1119 December 10 (AH 513 Ramadan 5): In Iran, Qazvin was destroyed by an earthquake.

1120 November 29 (AH 514 Ramadan 5): Qazvin was shaken again. (Fol. 28a)

1121 March 21 — 1122 March 11 (AH 515): In Arabia, Hijaz was shaken.

1122 March 12 — 1123 April 30 (AH 516): At Ganzah (12) as a result of an earthquake, part of the walls sunk. Many places in Iran suffered.

1130 February 12 — March 13 (AH 524 Rabi-I): Many houses were destroyed in Baghdad.

1135 July 25 (AH 529 Shawwal 11): At Baghdad earthquake shocks which begun in July 25 continued the whole day. Until July 31 nine earthquakes had shaken Baghdad.

1137 September 19 — 1138 September 7 (AH 532): An earthquake caused great damage in Syria, Mesopotamia and Iraq. Many persons were buried under the ruins. (Fol. 28b)

1138 September 8 — 1139 August 27 (AH 533): During this period Ganzah was badly shaken and within its dependencies 230,000 persons perished. The town itself sunk and the place it occupied was covered with black water for a distance of ten parasanges. The town of Aleppo was shaken eight times in one night. This earthquake was felt over all the world. (Fol. 28b) * Egypt was also shaken during this year. (Fol. 34a)

1144 May 19 (AH 538 Dhu'l-Qa'da, 14): There was an earthquake over all the world.

1149 May 11 — 1150 April 29 (AH 544): An earthquake at Baghdad shook the city ten times and at Arash a mountain fell. The tribe of the Turkomans suffered great losses.

1154 March 18 — 1155 March 6 (AH 549): An earthquake caused the waters of Tigris to disappear for some time; at Wasit the waters turned red. (Fol. 29a)

1155 March 7 — 1156 February 24 (AH 550): An earthquake shook Baghdad.

1156 May 16 — December 8 (AH 551 Rabi-I 25 — Shawwal 20): During this period many earthquakes shook Syria. On the 19th of May about forty

¹ Sprenger gives an earthquake in Syria for AH 484. This was not found in Or.5872.

shocks took place at Aleppo and Hamat and many other places; the shaking was tremendous. Aleppo was shaken again on the 23rd. Other shocks occurred on the 18, 20 to 30 of October and continued until the 8 of December. (Fol. 29b-30a)

1157 February 13 — December 29 (AH 552 Muharram - Dhu' - Qa'da 25)**: During this period Syria was badly shaken. Aleppo was destroyed, and Hamat, Shayzar (13), Hims, Hisn-al-Akrad (14), Antiochia, Latakia, and other places suffered much. In Shayzar only one woman and a slave were saved. In Kafar-Tab (15) not one person was saved. The same happened at Kalat-el-Mudik and Fahmyah (16) where the castle was swallowed up and many Romans and Greeks perished. The walls of several towns of Syria were destroyed; the children perished in the schools and no one came to ask for them. (Fol. 29a) Syria was first shaken on April 2. Then on the 3rd and 4th, with another shock following on July 1st. On July 15 Aleppo, Hims and their dependencies were destroyed; the shock extended in Hamat, Kafar-Tab and Taima. On August 12 Damascus was shaken so violently that never the like had been seen; it caused some destruction. The shaking continued for another two days. Other shocks on the 16 which lasted till the 19th did great damage in Hamat, Shiraz, and Hims. Damascus was shaken again in September 6 and caused great consternation. Aleppo and Fahmyah were damaged again on October 30, where the shaking continued for sometime with intermissions. Fahmyah was shaken again on the 14, 25 and 29 December with the result to be completely destroyed. The population abandoned their town and took refuge in the fields in wooden huts. (Fols. 30a-33b)

1169 September 25 — 1170 September 13 (AH 565): An earthquake shook all the world. Walls and houses collapsed in Damascus, Hims, Fahmyah, Aleppo and Ba'albek. Syria and Mesopotamia suffered greatly during this period.

1178 June 19 — 1179 June 7 (AH 574): The country of Arbil and of Armenia were badly shaken. At Arbil the earthquake was so severe that mountains fell upon each other. (Fol. 34a)

1180 May 28 — 1181 May 16 (AH 576)*: A great earthquake.¹

1195 December 6 — 1196 November 23 (AH 592)**: An earthquake over all Egypt. Mecca was also shaken.

1197 April 29 (AH 593 Jumada-II,9): A large star was split and a tremendous noise was caused by it which made the earth tremble. (Fol. 34b)

1201 July 5 — August 2 (AH 597 Shawwal)**: An earthquake occurred which shook almost all the world, more particularly Upper Egypt and Syria, where it caused great destruction. It extended to Mesopotamia, the Greek Empire and Iraq. Most of the castles on the Syrian coast were destroyed; Tripolis, Tyre, Acre, Nablus were completely destroyed and 30,000 persons perished. Most of the castle of Ba'albek collapsed and the mountains were rent asunder. The shock extended to Cyprus and it was felt in Armenia(E) and Azerbaijan. The first shock lasted but a short time but after that it continued for several days and it seems that it came from Mesopotamia to the coasts. It is calculated that through this earthquake 1,100,000 lives were lost. (Fols. 34b-36b)

1202 April 26 — May 24 (AH 598 Sha'ban)*: An earthquake destroyed the castle of the Kurds at Hims; the shock extended to Nablus.²

¹ Sprenger gives AH 575, not found in Or.5872.

² Sprenger gives AH 578. Not found in Or.5872.

1203 September 10 — 1204 August 28 (AH 600): Egypt, Mesopotamia, Syria, Iraq, the Greek Empire and Cyprus were shaken by an earthquake. It extended to Sabka (17) in Syria, and North Africa (18).

1208 July 16 — 1209 July 5 (AH 605): An earthquake shook Neyshabur for ten days. (Fol. 37a)

1211 June 15 — 1212 June 2 (AH 608): Egypt and in particular Cairo were shaken by a severe earthquake; many persons lost their lives.

1226 May 30 — June 27 (AH 623 *Jumada-II*): An earthquake in Egypt.

1256 June 28 (AH 654 *Jumada-II,3*)*: A noise was heard near Medina, for two days, which was followed by a great earthquake which caused great destruction in Hijaz. (Fol. 37b)

1258 December 29 — 1259 December 17 (AH 657): An earthquake in Egypt.

1262 November 15 — 1263 November 3 (AH 661): Masul was shaken by an earthquake. (Fol. 38a)

1263 November 4 — 1264 October 23 (AH 662): An earthquake in Egypt.

1268 September 10 — 1269 August 30 (AH 667): Kozan (19) was severely shaken; many castles were destroyed and many persons perished.

1293 January 11 — February 8 (AH 692 *Safar***): Ramla, Lod, El-Kerk (20), and three villages were destroyed. Gaza was also damaged.

1293 December 2 — 1294 November 20 (AH 693): An earthquake in Egypt.

1302 August 26 — September 24 (AH 702 *Muharram*)*: Damascus was shaken by a violent earthquake¹. (Fol. 41a)

1303 August 8 (AH 702 *Dhu'l-Hijja* 23): Egypt and Syria were struck by a violent earthquake; many persons were buried under the ruins. The shocks lasted for 40 days and the sea advancing submerged half of the city of Alexandria. (Fols. 38a-41a)

1339 January 13 — February 11 (AH 739 *Rajab*)*: Syria was shaken by a violent earthquake. Tripolis suffered much.²

1343 May 26 — 1344 May 14 (AH 744): An earthquake in Egypt and Syria.

1364 September 28 — 1365 September 17 (AH 766): An earthquake in Cairo.

1373 June 23 — 1374 June 11 (AH 775): A slight earthquake at Cairo

1377 January 12 — February 10 (AH 778 *Ramadan*)*: Cairo was shaken twice in one hour.³ (Fol. 41b)

1385 September 19 (AH 787 *Sha'ban* 13): A slight earthquake in Egypt which was felt at Cairo.

1386 July 17 (AH 788 *Jumada-II,18*): A slight earthquake in Egypt.

1389 January 30 — February 27 (AH 791 *Safar*): An earthquake in Iran. At Neyshabur many persons perished. It was the seventh time that this town was shaken and this was the worst. (Fol. 42a)

¹ Sprenger gives AH 722.

² Sprenger gives AH 729.

³ Sprenger gives AH 741. Not found in Or.5872.

1403 December 16 — 1404 January 13 (AH 806 *Jumada-II*)*: An earthquake at Aleppo and its dependencies.

1404 November 5 — December 4 (AH 807 *Jumada-I*): Aleppo shaken again.

1407 April 9 — May 8 (AH 809 *Dhu'l-Qa'da*): Antiochia was shaken and many lives were lost.

1408 December 20 — 1409 January 17 (AH 811 *Sha'ban*): Near Aleppo and Tripolis many lives were lost by an earthquake.

1419 January 28 — 1420 January 16 (AH 822): Erzincan (21) and Constantinople were shaken by an earthquake.

1421 December 26 — 1422 December 14 (AH 825): Cairo was shaken by a slight earthquake. (Fol. 42b)

1425 June 18 — July 16 (AH 828 *Sha'ban*): A strong earthquake shook Egypt for two minutes.

1431 April 14 — May 12 (AH 834 *Sha'ban*): An earthquake in Granada and Andalucia in Spain.

1434 November 4 — December 2 (AH 838 *Rabi-I*): An earthquake at Cairo.

1438 January 28 — February 25 (AH 841 *Sha'ban*): A slight shock at Cairo.

1456 November 29 — 1457 November 18 (AH 861): A strong earthquake destroyed most parts of Erzincan.

1458 November 8 — 1459 October 27 (AH 863): At Kerk 100 persons perished due to an earthquake. (Fol. 43a)

1476 April 26 — 1477 April 14 (AH 881): A light shock in Egypt.

1481 March 18 (AH 886 *Muharram* 17)*: A violent earthquake in Egypt.¹

1483 June 15 (AH 888 *Jumada-I,9*): A slight earthquake in Egypt.

1484 March 29 — April 27 (AH 889 *Rabi-I*): Aleppo was shaken more than six times. (Fol. 43b)

1491 April 25 (AH *Jumada* 15)**: Egypt was shaken by a slight earthquake. It was shaken again on 1st May.

1500 July 25 (AH 905 *Dhu'l-Hijja* 27)**: A slight earthquake in Egypt.

APPENDIX I

- (1) Massisa or Mopsueste or Misis (Turkey).
Abul-Fida (vol. 2, ii, pp. 12, 15, 27-29, 34); Hudud al-'Alam (P. 34b § 38).
- (2) Darayya or Darahia or Ed-Darah or Dariah (Syria)
Abul-Fida (vol. 2, ii, 28).
- (3) Kairouan (60 miles south of Tunis)
Tagri-Bardi.
- (4) There are two Harrans, one in Syria (32 53N - 36 22E) and another in Turkey (36 51N - 39 01E).

¹ Sprenger gives AH 880. Not found in Or.5872.

- (5) Hims or Emesa or Hems.
Abul-Fida (vol. 2, ii, pp. 6-7, 10, 14, 37, 38, 40).
- (6) Nesa or Ruha or Roha (Turkey) ancient Edessa.
Tagri-Bardi.
- (7) Dinawar or Deinaver or Dainawar WNW of Hamadan near Qirmisin.
Abul-Fida (vol. 2, ii, p. 163).
- (8) Nesa or Ladnesa or Nisa. City in Kirmaan in S. Iran or the town of Muhammadabad (Darre-Gaz) in Kurasan.
Firdushi (vii §89, viii § 19).
- (9) Wasit town on the Tigris at the centre of Basra, Kufah, Ahvaz, Baghdad.
Another town 15 miles S. of As-Safra in Arabia.
Aboul-Fida (vol. 2, ii, p. 80).
- (10) Urgun or Argan, town in Afganistan (32 50N - 69 10E). Argan or Arraghan or Ardjan is the name of the district of Ahvaz in Khouzistan.
Also, pface in Fars. Argah town in Arabia (28 17N - 48 14E).
Aboul-Fida (vol. 2, ii, p. 90).
- (11) Lord's Temple in Jerusalem.
- (12) Ganzah or Ganja, town in Armenia.
Hudud al-'Alam (32b § 36).
- (13) Shayzar or Shaizar, in Syria near Kafar-Tab and Hamat.
Hudud al-'Alam (34b § 38), Tagri-Bardi.
- (14) A castle at Akrad in Syria.
- (15) Kafartab or Capher Tab or Kafar-Tab a town 20 miles NW of Hama in Syria.
Tagri-Bardi.
- (16) Fahmyah or Apamea or Afamyah town in Syria. Its dependencies at a time called Kalat el-Mudik. There is another town with the same name near Wasit and Fam-as-Silh.
Abul-Fida (vol. 2, ii, p. 39).
- (17) Sabka, town in Syria 16 miles SE of Raqqa.
- (18) Maghrib-alacca, Maghrib-alaussath, Maghrib-afrykya.
Abul-Fida (vol. 2, p. 168): Hudad al-'Alam (§ 36a).
- (19) Kozan or Sis in Turkey (37 27N - 35 47E).
- (20) There are two Kerks or Keraks. One in Transjordan, Kerak or Karak or El-Kerak situated about 13 miles E of the Dead Sea near Kir-Moab. The other, Krak, or Crac des Chevaliers, or Hosn el-Akrad is near Akrad and Homs in Syria. Vitry (§ 92).
- (21) Erzincan or Arzankan or Arzandjan or Arzangan a town in Turkey between Siwas (Sebastia) and Erzerum.
- (22) Wazirabad or Balkh in Afganistan (36 46N - 66 50E). Balkh is the name of the citadelle.
- (23) Fergana a town in USSR Uzbekistan (40 23N - 71 19E).
- (24) Talikan or Taliq-an, town in Afganistan (36 46N - 69 29E).
- (25) Halvan or Haluan in Iran (33 57N - 56 13E).
- (26) Parasang (Pharsakh) is regarded by Arabic authors as equivalent to three Arab miles. The Arab mile has been variously estimated, and was probably of rather more than 2,000 yards. One parasang = 3.4 miles.

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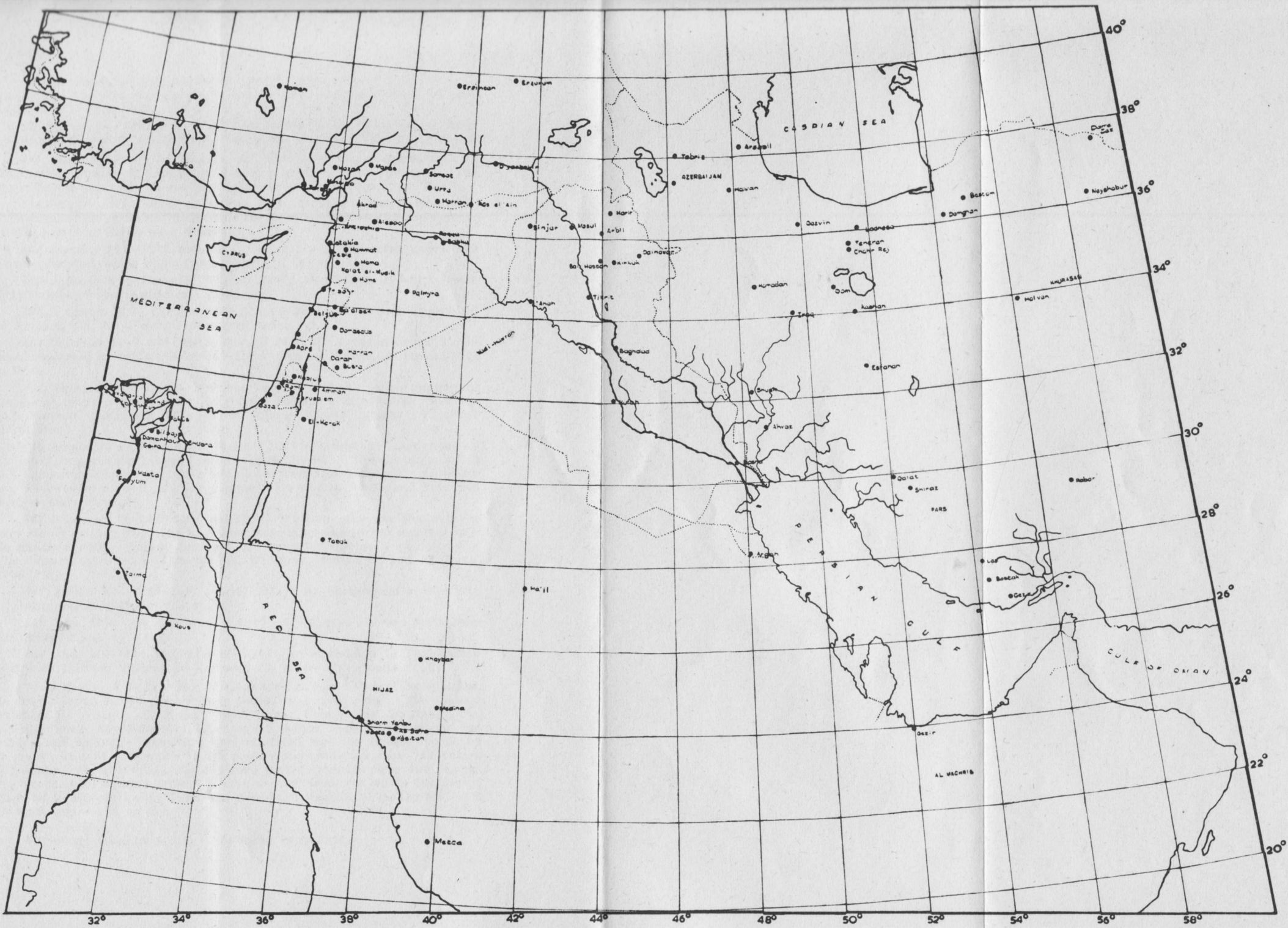


Fig. 2. — South-West Asia

1842.]

The Curator of the Museum Economic Geology was requested to give due effect to the wishes of the Military Board, and the Secretary to publish Capt. TREMENEER'S Report in the Journal.

A letter from Lieut. BAIRD SMITH, B. E., N. W. Provinces, was read, stating that he was engaged in researches about Indian Earthquakes, and requesting particularly the assistance of the Society in procuring a copy of a Persian or Hindoostanee work relative to this subject, entitled the ZIL-ZILLIE NAMA. The note was referred to the Librarian to enquire for the work in question.*

THE EARTHQUAKE.

Shortly after the above letter had been read, a smart earthquake was felt! The following note relative to it was drawn up, and signed by the Hon'ble the President, as expressing generally the opinions or feelings of the meeting:—

Memorandum.

At 1 to 10 P. M. the proceedings of the Society were interrupted by two or three slight vertical shakes or heaves, with a noise like the rumbling of a passing carriage, and one strong horizontal shake from East to West, or from N. E. to S. W. The whole took place within about half a minute of time. H. T. PRINSEP.

We may add, that the Barometer stood about half an hour afterwards at 30.5, and the Thermometer at 80°. The weather was squally with light showers at times from the East, but clear and cool in the intervals. The exact time at which the shock took place was, as will appear from the following note from Mr. E. GRAY, Watchmaker, 9h. 38m. P. M.

To ascertain the exact time, as nearly as possible, Mr. Piddington addressed a Note to Mr. Gray. His reply is as follows:—

DEAR SIR,—I did note the time when the Earthquake took place. It ceased at 9h. 38m. P. M. My clocks, as you may suppose, required my immediate attention, and I found their weights swinging in a direction somewhat from the North of the East point to the South of West, but from which of these quarters it came, I cannot pretend to say.

Yours most obediently,

E. GRAY.

15th November, 1842.

A paper, being a first article of "Contributions towards a History of the Development of the Mineral Resources of India," by S. G. TOLLEMACHE HEATLY, ESQ. was presented, and referred to the Editor of the Journal for publication.

* No trace of this work could be found, and the Calcutta Persian literati doubt of its existence. Two extracts, one from the Ewatee-oos-Seir and the other from the Herat-ul-Hecmut, were sent to Lieut. Baird Smith by the Secretary.

Read the following extract of a letter from Lieut. BAIRD SMITH, referring to his former enquiry as noticed in the Proceedings of (See November or December Proceedings.)

Camp Delhi, 11th December, 1842.

MY DEAR SIR,—Accept my best thanks for the trouble you have taken in forwarding to me the extract from the Papers, relative to the Earthquake of the 11th ultimo, and those in Persian &c. relative to Earthquakes in general. Both are most acceptable, and you will oblige me by thanking Mr. Torrens in my name for the latter.

There is no doubt whatever as to the existence of the Zill Zillee Namah, and that portion of the Calcutta native savans who doubt of this, because not themselves aware of it, have fallen into the not unusual error of reducing the information of others to the standard of their own ignorance. Dr. Falconer has repeatedly seen and examined it during his travels in Cashmeer, and by a note just received I learn, that although a copy of it cannot be procured in Delhi, many of the learned natives there are acquainted with the work. I fear, however, that it is from Cashmeer only that it is to be procured, and I have sought the aid of Mr. George Clerk in procuring it thence.

Very sincerely yours,

R. BAIRD SMITH.

Read the following letter from the Curator in the Zoological Department:—

Asiatic Society's Museum, 13th December, 1842.

SIR.—I beg to represent to you the urgent necessity that exists for not longer de-