

ASIATIC PAPERS

PART II

PAPERS READ BEFORE THE
BOMBAY BRANCH OF THE
ROYAL ASIATIC SOCIETY

BY

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*An Account of Comets as given by Mahomedan
Historians and as contained in the books of
the Pishinigan or the Ancient Persians
referred to by Abul Fazl.*

(Read 9th February 1910.)

The present year is one, during which, as announced by astronomers,¹ we have to see three comets. They are the following :—

1. Halley's Comet, which appears at the interval of every 75 years. It will be at its perihelion, or the point nearest to the sun, on 18th May 1910 at about 10 a.m.

2. Temple's second periodical Comet, which appears at the interval of every $5\frac{1}{4}$ years. It was first observed in Milan on 3rd July 1873. It was subsequently seen in 1878, 1894, and 1899. It was last seen in November 1904.

3. D'Arrest's Comet which appears at every $6\frac{1}{4}$ years. It was first observed in 1851. Subsequently it was observed in 1857, 1870, 1877, 1890 and 1897. In some of the intervening years, and in 1903 when it was last expected to be seen, it could not be seen, being, as astronomers say, "unfavourably placed."

We are, as it were, on the eve of seeing Halley's comet, but before we could see this celebrated comet, whose observations by Halley have led to a great advance in the science of cometography, there appeared on our Western horizon, a new visitor which drew towards it hundreds and thousands of eyes every evening from our beautiful Backbay foreshore and from other parts of our country. I do not know if it is altogether a new visitor.

As said above, we are on the eve of seeing Halley's great comet, before which, the one that we have already seen this year is a mere child of yesterday. Some observers have already seen it with their powerful telescopes. The Directors of the Heidelberg and the Cambridge Observatories have already seen it. The Director of the latter Observatory has announced that its appearance is like that of a star

¹ *Nature* of January 1910.

of the 14th or 14.5th magnitude. At this juncture,¹ I hope, that an account of the comets as given by some Mahomedan historians, and as contained in the books of the ancient Persians will be found interesting. I think that a part of this account will be of some interest, even to scientific men, because, if I do not mistake, the account of the comets by Abul Fazl, which will form the principal part of my paper, will be presented fully for the first time, before the students of cometography.

Division of the subject.

I propose dealing with the subject under the following heads :—

- I. The version of some Mahomedan historians about comets.
- II. The identification of the comets seen or described by them.
- III. An inquiry into the views of Mahomedan writers on comets.
- IV. The influence attributed by the people to the appearance of comets.
- V. The views of the *Pishinîgân* or the ancient Persians.

List of the Mahomedan Authors referred to in the Paper.

The Mahomedan authors, whose versions I propose giving, or to whom I am going to refer in this paper, are the following :—

1. Maçoudi, who lived at the end of the third century and in the first half of the fourth Hijri century. He was born in Bagdad but he had visited India. In 912 A. D., he was in Mooltan. In 916 A. D. he had again come to India and had lived at Cambay and in other places. So, though not born in India, we take him as an Indian historian for our purpose. There is only one reference to a comet in his *Maruj-ul Zahb* or "Prairies of Gold."

2. Abul Fazl, the celebrated Prime Minister of King Akbar of India. He describes, in his *Akbar-nâmeh*, a comet that he had seen in the 22nd year of the reign of Akbar (985 Hijri, 1577-78 A.D.). Before describing this comet, he writes, as it were, a long introduction, giving, not only his view of the phenomenon of the appearance of a comet, but the views of the learned of his time. While doing so, he refers to Greek, Roman, Egyptian and Hindu writers on the subject also. Having given his introduction, he describes three comets that had appeared before his time. Of course, this must be on the authority of some previous writers whom he does not name. This account of the comets will, I hope, interest some scientific men. As

¹ A paper on this subject has appeared from my pen in the "Revue de Monde Musulman" of Paris, in its issue of January 1910 (Volume X, Numero I). Later on, it was read before this Society, with some modifications and additions suggested by a further study of the subject.

far as I know, that portion of the Akbar-nâme, which gives this long account of the comets, is not hitherto translated into any other language. I give my own translation, in which I have followed the text, edited for the Asiatic Society of Bengal by Maulawi Abd-ur-Rahim :

3. Ahmad-bin-Mahmad, the author of the Nigaristan, written in 1552 A. D.
4. Nizâm-ud-din, the author of the Tabakât-i-Akbari.
5. Badaoni, the author of the Muntakhab-ul-Tâwarikh.
6. Jehângir, the author of Wakiat-i-Jehangiri.
7. Mutamadkhan, the author of Ikbâl-nameh-i-Jehangiri.

I.

THE VERSION OF SOME MAHOMEDAN HISTORIANS ABOUT COMETS.

I will now give the version of the Mahomedan historians I have named above. I will give the versions of four in the words of their translators. The rest I have translated from the original.

I will give, at first, Abul Fazl's version about the comets, as it is the largest and fullest. As said above, I give my own translation of his version in the Akbar-nâme.¹

Abul Fazl's version of the comets of 1264, 1400-1, 1433 and 1577 in his Akbar-nâme.

“In the matter of the appearance of a tailed comet which appeared after sunset (lit. after the time of the sitting of the great luminary—which bestows favours upon the world—on the chair of the west of the earth).

“A preface is written for a complete comprehension of the description of the symbol of the Heavens.

“When the rays of the world-illuminating sun fall on the moist earth, it is heated by the lustre of that exalted luminary, and some of the particles of water, becoming lighter rise upwards, and mixing with particles of air take an upward direction. This mixture is called vapour (*bokhâr*).

“When the parched earth becomes the seat of the heat of the illuminator of the world (*i.e.*, when it is heated by the sun), the essence of

¹ Maulawi Abd-ur-Rahim's Text for the Asiatic Society of Bengal, Vol. III., pp. 221-224.

moisture from its ambushade is attached to dryness. Then, by the influence of the heat, particles of earth being heated become lighter, and after mixing themselves with air fly above and that intermixture is called steam (*dakhân*).

“ Each of these is of two kinds. One is confined to the earth and springs, streamlets and streams come into appearance.¹

“ The second, appearing on the surface, rises up pompously. From this are formed clouds, rain, hail, thunder, lightning and such other phenomena. Books of Natural Science give explanatory accounts of these very clearly.

“ Now, let a little of the manifestation of that wonderful image (*viz.*, the comet) be written for the pleasure of the garden-ground of information (*i.e.*, I will now write something about the phenomenon of a comet for the information of my readers).

“ It is not concealed from (*i.e.*, it is known to) the writers of wisdom, that every time Mars attains ascendancy over the tract of a country, it makes the land of the country dry, and foul vapour and steam arise in large quantities, especially, in the commencement of the year or the season, when Mars is in the 10th and when the unhappy constellation may be that of *bâdi* (*i.e.*, that of Gemini, Aquarius and Libra) and of *âtashi* (*i.e.*, of Aries, Leo and Sagittarius) and when the moon or Mercury is in the *bâdi* (*i.e.*, in the signs of Gemini, Aquarius and Libra), so that it looks towards them with an eye of amity. Anyhow, fields are then devastated and the beginning of a famine is in sight; sickness is prevalent, calamities gain strength and the thread of the pursuit of knowledge is broken.

¹ This refers to the action of what Abul Fazl calls *dakhân* or steam. Here he explains, not in a clear or distinct way, how streams and springs are formed. Modern science also attributes to the formation of steam, the rise of springs, &c. Prof. Anstead's following description elucidates what Abul Fazl says :—

“Of the water that falls on the earth as rain, we have seen that a certain part runs off the surface by rivers into the sea, or is evaporated back again into the atmosphere within a very short time. The remaining part disappears. It passes into the earth's crust being absorbed into the soil and surface-rocks or entering the innumerable crevices and fissures that exist in all rocks near the surface. Making its way through permeable rocks, such as sand, or passing into natural reservoirs or along some underground channel, it circulates through the earth for a time, longer or shorter, according to circumstances, and comes at length once more to the surface. If it falls in a district greatly above the sea-level, it may issue in springs at some lower part of the same country, or, by the pressure it exerts when the rocks are full, may force out other water that has already performed a long journey. If it falls near the sea, it may still be brought back into circulation, for we know that the temperature of the interior of the earth is higher than at the surface; and it is quite possible that a little water, penetrating the depths at which it would be converted into steam, may exercise a pressure sufficient to overcome the force of gravity, and help to force up large columns of water from great depths, which may either rise through fissures at a high-temperature in thermal springs, or, oozing upwards, may again become cooled before reaching the surface. It may and does re-appear in this way naturally, and at ordinary temperatures. All water obtained or obtainable from the interior of the earth is called *spring water*, and all sources of water within the earth are called *springs*.”—Physical Geography, by Prof. Anstead (1871, p. 213).

“ In short, when the tenacious thick vapour (rising) from its seat, attaches itself to the first layers of atmosphere which are heated, it acquires a pleasant look (*i.e.*, is illuminated), just as the lamp-black of a lamp becomes illumined from its contact with a lighted candle. It is then called *shahâb* (*i.e.*, meteor). When it begins coming down to the earth, common people think that it is a star that is coming down. If that does not happen on account of its connection, it is not illuminated, but burns, and profiting by the different kinds of weather assumes different forms like those of a man with locks of hair, a person having a tail, a person holding a lance in his hand, an animal with horns, or the like. Depending on the differences of its position, it fades soon, or lasts long. At times dreadful red¹ or black forms appear in it. The red forms, when thick, add to the terror. When thicker, it is the black forms that cause terror. In the ancient language, such a form is named *sawât-i-najum*² or *Zarwat'l Azwâb*³. Every one (of these forms) has a different name according to its feature. Thus, the one with locks is called *Zuzavâbê* (*i.e.*, the possessor of locks of hair) and the one with a tail is called *Zuzanâb* (*i.e.*, the possessor of a tail).

“ In Indian books more than 100 (names) are recounted. In Greek books, seven kinds are recognized and all are considered to be of the nature of Saturn or Mars. Those with locks of hair and those with tails are known to be more unlucky. Batlimus (Ptolemy) says that between the hairy comets and the sun, there is the difference of 11 constellations. Some Greeks are of opinion that the hairy comets appear towards the East at the time of the dawn and the tailed comets appear towards the West in the early part of the evening. Certainly from the repeated sight (of such phenomena) such a supposition can be made.

“ The wise men of India divide them into two kinds and take them to be auspicious and inauspicious (respectively). All are unanimous in saying this, that its (*i.e.*, the comet's) influence is reflected upon the country over whose zenith it passes or whose best inhabitants see it. It moves according to the position of the constellation in which it appears, and in accordance with the strength of the motion of the region of fire.⁴ Its influences appear in proportion to (the time of)

¹ Cf. the description of the appearance of Halley's comet in 1835 by Mr. E. V. Heward :— “ It glowed like a red-hot coal of oblong form.” It appeared like “ a blazing rocket.” (The Story of Halley's comet. *The Nineteenth Century* of September 1909, p. 532).

² Lit. “ Keeper of the ward-robe of the stars.”

³ *i.e.*, “ Mistresses of locks.”

⁴ Compare with this, the words, “ Chariot of Fire,” applied to a comet by Mr. E. Vincent Heward in his Story of Halley's Comet (*The Nineteenth Century* of September 1909, p. 51 a).

its stay (*i.e.*, the longer it appears, the greater its influence as to good or bad luck to the country). In the writings of the ancients, nirangs (نیرنگ incantations) for (counteracting) these influences are mentioned more than can be described.

“ Out of all (these comets) one hairy comet appeared in the year 662 Hijri.¹ The increaser of the splendour of the world (*Farugh afsâe-i-âlam*) was in the sign of Leo and had gone about 11 fingers² down the earth (*i.e.*, had set) in the night. The strange thing was, that it (*i.e.*, the comet) appeared to be of the proportion of the head of a big man and emitted steam from its front. It passed (*i.e.*, appeared) in the countries of Tibet, Turkestan, China, Kashgar, Fargâna, Ma'wara'u'n-nahr (Transoxania) and Khorasan. It appeared for 85 days. In all these countries, there arose rebellions. In Transoxania and Khorasân, calamities of thunder³ and lightening and such other (phenomena) appeared.

“ Many years and months had passed over this event, and then, in 803,⁴ a tailed comet appeared in the zenith at Rum (Constantinople). Mulana Abdallalasan and Mahiâddin Magrabi with other astrologers of that time informed Timur, that from what the wise and the experienced have said it appears that an army (coming) from the direction of the East will be victorious in that country, and a general from that country will assist (him). Timur (lit. that illuminator of the face of fortune), who was always expecting an invasion of the country, but whose companions of poor intelligence did not acquiesce, attended to that (prediction) and convinced the great and the small (of his court) of the truth (lit. gem) of his resolution and of the insight of the star-seers.

“ In the year 837,⁵ on the occasion of a new moon in the first part of Libra, a tailed comet appeared (lit. gave brilliancy to the day) near the 17th lunar mansion in the north. It rose and set with it. After the lapse of several days, its special motion appeared. From that 17th lunar mansion in the north (a form like that of) a lanceholder separated (lit. assumed the face of separation), and in 8

¹ A. D. 1264.

² A kind of measure.

³ Taking the word to be *ra'ad* رعد . The Bengal Asiatic Society's text gives the word as *قاید* which is the last star in the tail of the Lesser Bear. It also means a governor. But these words seems to have no proper meaning here. In the foot-note it gives *râvad* راید as found in another manuscript. I think it is mistaken for *ra'ad* رعد which suits well

with the next word *barâk* (براق) “flashing.”

⁴ 1401 A.D.

⁵ 1433 A. D.

months, took the path of the camel. A great pestilence, spreading misery (round about), appeared in Herat and its dependencies. Every day more than a thousand persons died. Mirza Ibrahim, the governor of Fars and Mirza Bysangar Arghun, the King of Badakhshan, and Shaikh Zai-ud-din Khafi died in this calamity. A fierce quarrel, which took place between Mirza Shah-rokh and Sikandar Karâ Yusaf, was also the consequence of this (comet).

“ The learned in the mysteries of the Heavens are convinced of this, that, if it appears within the boundaries of a country, its king or his vice-regent dies. If it is declined towards the boundary, the property, *i.e.*, the country of the governor passes away from his hands,¹ and plague and diseases and afflictions add to the sickness of the country. Sudden deaths occur among the common people.

“ A thousand thanks to God, that, owing to the benedictions of the holy soul of the King (Akbar), (bad) influences and misfortunes have disappeared from his dominions. If, in case, such a terrible sign (*i.e.*, a comet) appears, a great calamity does not overtake this country. In spite of such Divine protection, that intelligent person of the assembly of information (*i.e.*, the intelligent and well informed King Akbar) ordered alms to be distributed on a large scale according to the customs of the Mahomedans and Brahmans, and people of all places became cheerful. The most beautiful thing of this great liberality (*i.e.*, the result of this alms giving) was this :—

“ On the day Arad (Arshisang), the 25th of the Ilâhi month Abân, at the time, when the sun made his conspicuous appearance in the sign Scorpio, this heavenly sign (*i.e.*, the tailed comet) kindled its brilliant face in the sign of Sagittarius, faced towards the west (and) inclined towards the north. It had a long tail. It had reached such a limit, that in many towns they saw it for five months. The well informed astrologers, and those skilled in the mysteries belonging to the higher (*i.e.*, celestial) assembly, explained it thus :—‘ That among some of the inhabited parts of Hindustan, there will be a scarcity of grain, and they specified some particular places. The time of the ruler of Iran will come to an end and in Iran and Khorasan there will arise disturbances.’ All, that was said, came to pass without anything being less or diminished. A short time after, a caravan came from Iran. Some of its well informed men of truthful mind informed His Majesty of the death of Shah Tahmasp and of the murder of Sultan Haidar and of the accession to the throne of Shah Ismail.

¹ Cf. The words of Louis le Debonnaire, on seeing Halley's comet in 837 A.D. He said :—“ A change of reign and the death of a prince are announced by this sign (The story of Halley's comet. *The Nineteenth Century* of September, 1909. p. 518).

“The purport of all this detailed account is this :—The King of heavenly abode (*i.e.*, King Tahmasp) died in the beginning of the Ilahi month Khordad”

I will now give the version of other Mahomedan writers in the order in which I have named them above.

Maçoudi's Muruj-ul Zahb.

Maçoudi, speaking of the events of the Hijri year 299 (911-12 A.D.) thus speaks of the appearance of a comet in that year. Though born in Bagdad he was in India at the time when the comet appeared.²

“Une grêle énorme, composée de grêlons pesant un *rill*, poids de Bagdad, tombe sur Koufah en même temps qu'une bourrasque de sirocco, au mois de ramadan ; plusieurs maisons et édifices sont renversés. Ce sinistre est suivi d'un tremblement de terre qui coûte la vie à un grand nombre d'habitants. Ces désastres eurent lieu à Koufah en 299. La même année est signalée par un tremblement de terre en Egypte et par l'apparition d'une comète.”³

THE VERSION OF AHMAD BIN MAHMAD, IN HIS NIGARISTAN,⁴
OF THE COMET OF 941-42 A.D.

In the year 330 5 (Hijri), there appeared a comet whose tail appeared from the East to the West. It remained for 18 days. From the influence of this inauspicious sign, one *jarib*⁶ of wheat cost 320 golden *miskáls*.⁷ One ear of corn was worth a beast of burden,⁸ the price of wheat rose so high. Men ate one another out of hunger. In the time of famine a plague appeared, so (virulent) that people had not the strength of burying the dead.

NIZAM-UD-DIN'S VERSION OF THE COMET OF 1578 IN HIS *Tabakát-i-Akbari*. TWENTY-THIRD YEAR OF THE REIGN⁹ (A.D. 1578-79).

“At this period, at the time of evening prayer, a comet appeared in the sky towards Arabia, inclining to the north and continued very awful for two hours. The opinion of the Astrologers was, that the effects would not be felt in Hindustan, but probably in Khurasan and

¹ Here follows an account as to how King Tahmasp died, Sultan Haidar was murdered, and Shah Ismail came to the throne.

² Maçoudi traduit par Barbier de Meynard, Vol. I, Avant-propos p. III.

³ Maçoudi traduit par Barbier de Meynard, Vol. VIII, pp. 281-82.

⁴ In this translation, I have followed the text published in 1245, Hijri, 1829 A.D. at the instance of Captain George Jervis (کپتان جارج جرویس صاحب) p. 70.

Vide Elliot's History of India, Vol. II., Appendix. p. 505.

⁵ 941'64, *i.e.*, 941-42 A.D.

⁶ Jarib is “a corn measure equal to four qafix.” Qafix is “a measure containing about 64 lbs. in weight” (Steingass).

⁷ “A weight of a dram and three-sevenths” (Steingass).

⁸ Parvin. It also means Pleids.

⁹ The beginning of the 23rd year of Jehangir's reign corresponded with Tuesday, the 2nd Muharram 986 H. (11th March 1578).

Irâk. Shortly afterwards, Shâh Ismail, son of Shâh Tahmasp Safawi, departed this life, and great troubles arose in Persia.”¹

I have given Elliot’s translation but have corrected it in one place. The first part of the passage as given by Nizam-ud-Din runs thus :—

دگر ظاهر شدن دور دانه درین ایام در وقت نماز شام در طرف
عرب صایل بشمال دور دانه زوی آسمان ظاهر شد

Elliot seems to be wrong in translating the word “ dar-tarf-i Arab ” by “ towards the East.” The word “ Arab ” does not mean ‘ East.’ It simply means ‘ Arabia.’ So, the words should be translated “towards Arabia.” Now, as Arabia is in the West, the words may be translated “ towards the West.” This translation will then tally with the statements of Badaoni and Abul Fazl, who say that the comet appeared in the West (مغرب Magreb).

There is one thing to be noticed in Nizam-ud-Din’s writing. He uses the word dur-daneh (دور دانه) for a comet. I do not find the word in the well-known Persian dictionary “ Burhân-i-kâtêh.” I do neither find the word in the Persian-English dictionaries of Richardson and Steingass nor in the English-Persian Dictionary of Wollaston. The Tabakat-i-Akbari alone uses it for a “ comet.” I think that this is an attempt to render into Persian, “ Gurcheher,” the Pahlavi word for comet, which can also be read “ durcheher.” We will speak of the Pahlavi word at some length later on.

Badaoni’s Muntakhab-ul-Tawârikh.

Badaoni’s version of the comet of 1578 as given in his Muntakhab-ul-Tawârikh ² runs thus :—

“ Among the unexpected events (one) was this, that in the same year, a comet appeared from the direction of the West. When Shah Mançur left a long tail from behind in the corner of his turban, they named him (in joke) ‘ a tailed comet.’ The effects of this comet appeared in that country.”

Badaoni, like Abul Fazl, places the event in the 22nd year of king Akbar’s reign, while Nizam-ud-Din, as seen above, places it in the 23rd year. Elliot thus explains the discrepancy :—

“ The twenty-second year began on the 20th Zi-l-hijja, 984, and being a solar year, it extended over the whole of Hijra, 985, and end-

¹ Elliot’s History of India, Vol. V, p. 407.

² Tabakat-i-Akbari. Munshi Naval Kishore’s lithographed edition of 1875 A.D. (1292 Hijri) p. 339 ll. 3-4.

³ Lees and Ahmad Alis text, Vol. II, p. 240, l. 16,—p. 241, l. 5. I give my translation from this text. Vide Lowe’s translation, Vol. II, p. 248. Vide also “ L’Empereur Akbar ” par le Comte F.A. De Noer, traduit de l’Allemand par G. Bonet Maury, Vol. I, p. 262.

ed on the 1st day of 986. The oversight of this fact has given rise to some confusion in the dates about this period, and the events here recorded as having occurred in the twenty-third year of the reign are placed by Abûl Fazl in the twenty-second."¹

When identifying the comet of King Akbar's reign, later on, we will see that it appeared in 1577, the 22nd year of Akbar's reign.

Jehangir's Wâkiât-i-Jehangiri.

The version of the author of the *Wâkiât-i-Jehangiri* about the two comets, that appeared in 1618 in King Jehangir's reign, runs thus (Elliot's History of India, Vol. VI, p. 363) :—

Saturday, 17th Zi-l-ka'da.² Several nights before this, a little before dawn, a luminous vapour, in the form of a column, had made its appearance, and every succeeding night it arose half an hour earlier than on the preceding night. When it had attained its full development, it looked like a spear with the two ends thin, but thick about the middle. It was a little curved like a reaping-sickle, with its back towards the south, and its edge towards the north. On the above-mentioned date, it rose three hours before sunrise. The astronomers measured its size with their astrolabes and, on an average of different observations, it was found to extend 24 degrees. Its course was in the empyrean heaven, but it had a proper motion of its own, independent of that firmament, as it was retrograde—first appearing in the sign of the Scorpion, and then in that of the Scales. Its declination was southerly. Astrologers call such a phenomenon a spear, and have written that it portends evil to the chiefs of Arabia, and the establishment of an enemy's power over them. God only knows if this be true !

“ Sixteen nights after its first appearance, a comet appeared in the same quarter, having a shining nucleus, with a tail in appearance about two or three yards long, but in the tail there was no light or splendour. Up to the present time, nearly eight years have elapsed since its first appearance, and when it disappears, I shall take care to record it, as well as the effects which have resulted from it.”

From the above extract, perhaps one may be led to suppose that the comet continued to appear for eight years. We will explain this matter, later on, while identifying this comet.

¹ Elliot's History of India. Vol. V, p. 403, n. 1.

² The year was Hijri 1027, A. D. 1618. *Vide* Elliot's History of India, Vol. VI, p. 356.

Mutamadkhan's Ikbâl Nâmeḥ-i-Jehangiri.

Version of Mutamadkhan, in his *Ikbâl Nâmeḥ-i-Jehangiri*, of the first of the comets of 1618 (Elliot's History of India, Vol. VI, pp. 406-7).

“On the 16th of De, an hour and a quarter before the dawn of the day, there appeared in the atmosphere a vaporous matter in the shape of a column, and it was seen half an hour earlier every succeeding night. When it appeared in its full form, it resembled the shape of a javelin. It was thin at both ends, and thick and crooked in the middle like a sickle. Its back was towards the south, and its face towards the north. The astronomers measured its size by means of an astrolabe, and upon a comparison of different observations, it was found to extend over 24 degrees. It moved with the highest of the heavens, but had a proper motion of its own ; so that it first appeared in the sign of Scorpio, and in a short time left it, and entered that of Libra. It also had a southerly declination. Astrologers in their books mention such a phenomenon under the name of a javelin. Sixteen nights after its appearance a star was seen in the same direction, the head of which was luminous ; but its tail, which was two or three yards long, emitted no light. It was in consequence of its appearance that a pestilential disorder (*wabâ-o-tâ' aûn*) spread throughout this extensive country of Hindûstân, which exceeded everything known and recorded in former ages, nor is there any mention made of such in the authentic works of the Hindûs. The pestilence arose in the country one year before the appearance of the phenomenon, and continued to rage for eight years. It was also through the effects of this phenomenon that a misunderstanding arose between His Majesty and the fortunate prince Shâh Jahân. The disturbances which thus originated lasted seven or eight years. What blood was shed in the country ! and what families were ruined !

“At this time it was learnt from the petition of Bahâdur Khân, Governor of Kandahâr, that in the environs and dependencies of the city, the mice had increased to such an extent that they left no trace of either crops or fruits. With the greatest difficulty, perhaps, only one-fourth of the produce was saved to the cultivators. In the same manner, the fields of melons and the produce of orchards and vineyards were totally destroyed ; and when no fruit and no corn remained in the gardens and in the fields, by degrees the mice all died off.”

II.

IDENTIFICATION OF THE COMETS.

We will now proceed to identify the comets described by the above-named Mahomedan authors. Mr. J. Russel Hind's book on comets

has been of great use to me in identifying them. The comets referred to by Nizam-ud-Din's *Tabakat-i-Akbari* and by Badaoni's *Muntakh-ab-ul-Tawārikh* are the same as that which is the fourth in the list of Abul Fazl ; so they do not require a separate identification. We will proceed in our work of identification in the chronological order of their appearance. The oldest comet referred to is the one mentioned by Maçoudi.

Maçoudi's Comet of 912 A.D.

1. The comet of Hijri 299 (911-12 A.D.) referred to by Maçoudi is Halley's Comet in one of its previous revolutions. Mr. Russel Hind, in his book on comets,¹ gives a table of the most probable epochs of the perihelion passages of Halley's Comet, commencing from 11 B.C. Therein we find its 13th appearance in 912 A.D. This date corresponds to Maçoudi's Hijri date 299. In this table, the author marks with an asterisk, the most certain appearances of Halley's Comet before the year 1456. This particular appearance is not so marked, because, probably, he had not before him any historical reference to it. But a new compiler can, I think, take this as a certain appearance on the authority of a well-known Arab author like Maçoudi. In another place, Hind refers to it as a comet observed at Constantinople.²

According to Mr. Chambers,³ there appeared two comets in 912 A.D. One of these was Halley's. The one referred to by Maçoudi must be Halley's, as it is referred to as a remarkable one, having been accompanied with other phenomena.

The Comet referred to in the Nigâristân.

2. Elliot⁴ surmised that the comet of Hijri 330 (941-42 A.D.), referred to in the *Nigâristân*, was Halley's Comet, one of whose probable appearances has been reckoned to be in 930 A.D. He surmised that, as there is always a difference of a few months between each period of its appearance, due to the action of planets and to other causes, this difference of nearly 11 years may be accounted. But Russel Hind has, in his book¹ on Comets, given a list of the epochs of its perihelion passages on former occasions from the date of its last appearance 1835 A.D. to 11 B.C. We do not find in that list its appearance in 941-42 or thereabouts. Again, we do not find any comet mentioned in this year either in the list of Russel Hind or

¹ The "Comets" by J. Russel Hind (1852) p. 57.

² *Ibid*, p. 15.

³ The Story of the Comets, p. 120.

⁴ Elliot's History of India, Vol. II, p. 506, n. 1.

in that of Ferguson.¹ So, for the present, we must take it as an unidentified comet.

Abul Fazl's Comets—First Comet.

3. (a) The first comet referred to by Abul Fazl is that of the year 1263-64 (Hijri 662). This comet is Comet III of Ferguson's² list. It passed its perihelion on 6th July 1264 at H. 7-50'-39", according to the mean time of Greenwich.³ Mr. Hind says of it that it was a great comet and that it "was accompanied by a train fully 100° long, agreeably to the Chinese description, while European contemporaries tell us, when the head was just clear of the eastern horizon, the tail stretched passed the mid-heaven westward, which seems to indicate an extent of more than 90°."⁴

Further on, Mr. Hind speaks thus of this great comet.—"One of the grandest comets mentioned in history is that which made its appearance in the middle of the year 1264. It is recorded in terms of wonder and astonishment by nearly all the historians of the age: no one then living had seen any to be compared to it. It was at the height of its splendour in the month of August, and during the early part of September. When the head was just visible above the eastern horizon in the early morning sky, the tail stretched out past the mid-heaven towards the West, or was fully 100° in length. Both Chinese and European writers testify to its enormous magnitude. In China, the tail was not only 100° long, but appeared curved in the form of a sabre. Its movement was from Leo, through Cancer and Gemini into Orion. It continued visible until the beginning of October, historians generally agreeing in dating its last appearance on the 2nd of October, or on the night of the death of Pope Urban IV, of which event it seems to have been considered the precursor. * * * * * Some rough approximations to the elements have been attempted in the first instance by Mr. Dunthorne, in the middle of the last century, and subsequently by M. Pingre, the well-known French writer upon the history of comets."⁵

According to Russel Hind, the comet of 1556, which, according to Ferguson's list, passed its perihelion on 21st April, was the same comet appearing after a period of 292 years. Then, it was "not

¹ Ferguson's Astronomy, explained upon Sir Isaac Newton's principles, by David Brewster 1811, Vol. II., pp. 360-67.

² Ibid p. 360.

³ The "Comets" by J. Russel Hind (1852), p. 127. Hind gives the hour as H. 7-51'.

⁴ Ibid, p. 12.

⁵ Ibid, pp. 116-17.

nearly so conspicuous as in 1264", but still was "a great and brilliant star."¹ It seems to have gradually lost its brilliancy. Hind² predicted its return between 1856-1860. Two comets³ have appeared within the period, in 1859 and 1860, but none has been clearly identified with it.

Abul Fazl also refers to the comet's passing from the sign of Leo and says that it was seen in Tibet, Turkestan, China, Kashgar, Fargana, Ma'wara'u'n-nahr (Transoxania) and Khorasan, and that it continued to appear for 80 days. From this, we see that it was a great comet and was seen even in China in the further east. All these facts and the year identify Abul Fazl's Comet of 662 Hijri as the great comet of 1264.

(b) We are not able to identify the second comet of Abul Fazl (Hijri 803, A.D. 1400-1) with any of the comets in the lists given in books of modern astronomy. According to Wollaston,⁴ the Hijri year 803 lasted from 22nd August 1400 to 10th August 1401. A remarkable comet appears in Grant's list, as given by Mr. Chambers,⁵ as one seen in 1402. So, perhaps it may be that comet.

(c) Coming to Abul Fazl's third comet (Hijri 837, A.D. 1433-34), I think it is the same as that of 1433 referred to by Russel Hind⁶ in his list of comets. It passed its perihelion on the 4th or 5th of November 1433. It was also observed by the Chinese.⁷

(d) The fourth comet referred to by Abul Fazl (Hijri 985, A.D. 1576-77) is the comet IX of Ferguson's⁸ list which passed its perihelion on 26th October 1577. Russel Hind also gives this comet in his list.⁹ It was of this comet that Tycho Brahe found "that it had no diurnal parallax, and that it was, therefore, situated at a much greater distance than the Moon."¹⁰ This comet has been identified by Elliot.¹¹ On the day of discovery it exhibited a curved tail 22° in length. The Chinese described it as of a bluish colour with a white vapour, and about 10° long.¹²

¹ Ibid, p. 117.

² Ibid, p. 122.

³ Newcomb's Astronomy for Everybody, 1903, p. 274.

⁴ Wollaston's English-Persian Dictionary, p. 1488.

⁵ The Story of the Comets by Chambers, p. 125.

⁶ "The Comets" by Russel Hind, p. 127.

⁷ Ibid, p. 141.

⁸ Ferguson's Astronomy by Brewster, p. 360.

⁹ "The Comets" by Russel Hind, p. 128.

¹⁰ Ferguson's Astronomy by Brewster, Vol. II, p. 355.

¹¹ Elliot's History of India, Vol. V., p. 407.

¹² "The Comets" by Russel Hind, p. 100.

“The elements of this comet were first calculated by Halley.”¹ As said above, Tycho Brahe’s name is greatly connected with this comet. Mr. E. V. Heward, in his article² on Comets, thus refers to Tycho Brahe’s work in connection with this comet which alarmed and surprised King Akbar’s court in India.

“To Tycho Brahe belongs the credit of being the first in Europe to open the way leading to the more accurate knowledge we have to-day of the comets in relation to their position in space, and on the sure ground of actual measurement with instruments he himself had made. This he was enabled to do through the munificence of Frederick II of Denmark, who, in order to secure for his country the services of so profound a reader of the stars, built for him a palatial home and observatory on the Island of Huen, at the entrance of the Baltic. Overjoyed with the grandeur of the edifice, Tycho called it Uraniberg—city of the heavens. Here for a period of twenty years he occupied himself in measuring and mapping out the position of the stars and planets, and in poring over their significance in relation to mundane affairs. While thus employed, on November 13th, 1577, a comet came into view. It was twilight, and the after-glow, seemed to tinge the visitor with a rosy hue ; but as the shades of evening closed in, its colour merged in bluish white. It was a beautiful object, with a train of silvery lustre sweeping over the heavens and dividing towards the end into two gracefully curved steams.”³

Abul Fazl saw this comet in India on the day Arad, the 25th of the Ilahi month Âban. Tycho Brahe saw it on 13th November 1577. The Ilahi Calendar of Akbar was, as we know, the Parsi Calendar. I give below a table of the Ilahi and Christian months to enable us to determine the relation of the above days.

The Ilahi or Parsee month.				Its corresponding Christian Date.	
Fravardin (commences)	...	...	...	...	21st March
Ardibehesht	...	...	...	...	20th April
Khordad	...	...	...	...	20th May
Tir	...	...	...	...	19th June
Amardad	...	...	...	...	19th July
Sheherivar	...	...	...	...	18th August
Meher	...	...	...	...	17th September
Aban	...	...	...	...	17th October.
The day Arad (Arshisang) <i>i.e.</i> , the				25th	
day of the Aban month fell on				...	10th November

¹ “The Comets” by Russel Hind, p. 149.

² “What are Comets and Meteors” in the *Fortnightly Review* of November 1909.

³ *Ibid.*, pp. 916-17.

This table, then, shows that while Abul Fazl saw the comet in India on the 10th of November 1577, Tycho Brahe saw it in the Baltic on the 13th of November 1577, about three days later. So the time is well nigh the same. Abul Fazl says that it had a "brilliant face." Tycho Brahe found it to be "a beautiful object." Both saw it in the western horizon.

In my paper on "The Parsees at The Court of Akbar and Dastur Meherji Rana," read before this Society on 19th December 1901,¹ I had examined at some length the question of the so-called miracle at the Court of Akbar connected with the name of Dastur Meherji Rana, and had said: "As Dr. West said, there may be some 'probable fact,' at the bottom, round which the story is interwoven. It may be a conjurer's trick, or it may be a meteorological phenomenon or it may be the astronomical phenomenon of a comet, which is actually noted by three historians of Akbar's time, *viz.*, Badaoni, Abul Fazl and Nizam-ud-din, and the occurrence of which has been confirmed by European astronomers. I am disposed to believe, that it was possibly the third fact, *viz.*, the phenomenon of the comet, that led to the tradition of the so-called miracle. It was believed, as Abul Fazl says, that evils resulted from the appearance of the phenomenon. They further believed that the writings of the ancients (*pishinigân*) had some *nirangs* (prayers) which averted these evils. So they may have turned to Dastur Meherji Rana for some of these *nirangs*."²

My present study of the subject of the comets has led me to strengthen my above belief still further. It is no wonder, if the great comet of 1577 surprised and alarmed the Court of Akbar and the country of India, when one reads, that even in Europe, the appearances of comets frightened not only the ordinary public but learned divines and poets, kings and nobles. We know of Pope Calixtus III that, at the time of the comet of 1456, during the period of the last Crusade, when Christendom fought against Mahomed III, he was so much frightened by the appearance of the comet, that he issued a Bull "exorcising the evil thing" and asked prayers to be said. The mid-day bell known as Angelus de Midi is connected by some with this prayer and with this event.

Mr. Heward says of this comet that "the eyes of Europe were fixed upon the apparition and many and crude were the conjectures hazarded to account for its presence."³ If that was the case in

¹ Journal of the B. B. Royal Asiatic Society, Vol. XXI, No. LVIII.

² *Vide* my book on "The Parsees at the Court of Akbar and Dastur Meherji Rana," p. 79.

³ "What are Comets and Meteors"—*The Fortnightly Review* of November 1909, p. 917.

learned Europe, no wonder that similar should be the case in the comparatively backward country of India.

Coming back to Tycho Brahe's work in connection with this comet, we further read that "with honest pride he announced his discovery, saying that he had demolished the artificial fabric of the ancients—the solid crystal spheres. The free spaces of heaven he filled with air and gave countenance to the Pythagorean belief that the revolving worlds produced harmonious tunes by their action on the surrounding ether."¹

The Comets referred to in the Wakiât-i-Jehângiri and in the Ikbâl Nâme-h-i-Jehângiri.

The Wâkiât-i-Jehângiri and the Ikbâl Nameh-i-Jehângiri refer to two comets that appeared in Jehangir's reign. Both appeared in the same year (Hijri 1027, A.D. 1617-18) with a short interval between them. We also find both from Ferguson² and Russel Hind³, that two comets had appeared in 1618. The first had passed its perihelion on 17th August 1618 and the second on 8th November 1618.

(a) Let us identify these comets. According to the Wakiât-i-Jehângiri,⁴ the first of the two comets appeared on the 17th Zi-l Ka'da of the Hijri year 1027 (A. D. 1618). This Mahomedan date, *viz.*, 17th Zi-l Ka'da, *i.e.*, the 17th of the 11th month of the Mahomedan year, corresponds to some day in November 1618. This identification of the Mahomedan and Christian dates helps us in the matter of identifying this comet with a comet observed by European scientific writers. According to the latter, one of the comets of 1618 "passed through perihelion on 8th November 1618."⁵ The Mahomedan Historian says that the comet appeared several nights before the 17th of the 11th month of 1027 Hijri (November 1618). A slight difference in dates presents no difficulty in our work of identification. Wollaston in his English-Persian Dictionary gives, at the end of his work, an excellent table of Mahomedan years, and their corresponding Christian years. We find from that table that the Mahomedan or Hijri year 1027 commenced on 29th December 1617, *i.e.*, only two days before the commencement of the Christian year 1618. Now the Mahomedan

¹ *Ibid.*

² Ferguson's Astronomy by Brewster, Vol. II, p. 360.

³ The Comets, by Russel Hind, p. 128

⁴ Elliot's History of India, Vol. VI, p. 356.

⁵ E. V. Heward in the *Fortnightly Review* of November 1909. Ferguson's Astronomy by Brewster, (1811), Vol. II, p. 360. J. Russel Hind's "Comets" (1852) p. 128.

month Zi-l Ka'da, given by the author of the Wâkiat-i-Jehângiri, is, as we know, the 11th month of the Mahomedan year. So, calculating from the 29th of December 1617, on which day the Mahomedan year 1027 began, the 11th month does not correspond with March 1618. It does correspond with November 1618, the month given by European scientific writers as the month during which the comet of 1618 appeared in its perihelion.

Thus, we see that, the first comet, referred to by the Wâkiat-i-Jehângiri as appearing on the 17th day of the eleventh month of Hijri 1027, is the comet of November 1618. It was believed to have brought on, the great "Thirty years' War." Milton was of the age of 10 when it appeared, and it is said¹ that, it was the impression made upon his boyish mind of 10 by this comet that made him say at the age of 50 in his "Paradise Lost" the following lines :—

. . . "On the other side,
 Incensed with indignation, Satan stood
 Unterrified, and like a comet burn'd,
 That fires the length of Ophiuchus huge,
 In the arctic sky, and from his horrid hair,
 Shakes pestilence and war" (Paradise Lost, B. II, ll. 708, et seq.).

Mr. Heward thus speaks of it—

"It was first caught sight of in November of that year, and was attentively observed by Keplar at Lintz, Father Scheiner at Ingolstadt, Marsilius in Bohemia, and also by the Jesuits at Goa. It passed through perihelion on November 8, and while thus saluting the sun it put forth a train which extended far past the mid-heavens to a distance of 104°. The magnificent appendage was greatly admired, for it sparkled with silvery lustre through its entire strength. And the head or body of the comet shone so brightly that Marsilius saw it in full daylight, and, more wonderful still, he says, that it cast a distinct shadow, as the Moon does. On the 25th, the tail crossed the Earth's path, and was estimated to be fifty millions of miles long. Father Cysatus saw in the body of the comet a bright, round nucleus, shining most vividly, through an immense shroud; at the same time the flickering tail seemed as if agitated by the wind, and from the head there shot forth luminous rays which instantly returned *cum vibratione enormi*. Then, to the astonishment of all, there followed a marvellous transformation. Before the eyes of the wondering spectators the comet opened out and separated into several parts, each part shining with a diamond-like sparkle. By December 20th, the whole body of the

¹ The Story of the Comets by Chambers, p. 211.

comet had resolved itself into a cluster of small bright stars, each one putting forth a tail of its own. Thus rapidly developed, and adorned with the attributes of beard and tail, they journeyed on together, a fine social group of comets. Before taking final leave of these parts they enacted a brilliant coup. Mingling their tails together, they sent forth an immense train, bright and sparkling, which measured about sixty millions of miles. Then, as if satisfied with the performance, the troop of celestial vagrants vanished from terrestrial gaze.

Arago, commenting upon the physical aspect of the spectacle, says : "The separation of the comet of 1618 into several fragments took place under the direct observation of Cysatus, Wendelin, and Scheiner."¹

Hind speaks of this comet as "a splendid comet" and as "one of finest ever observed."²

From the description of the comet as given by the above two Mahomedan authors, we find, that they refer to the same comet. But the date 16th of Dè given by the *Ikbâl Nameh-i-Jehângiri* (17th Zi-l Ka'da) does not seem to tally. I think that, perhaps the author of the *Ikbâl Nameh* has mistaken the Mahomedan month Zi-l Ka'da for Ilahi Dè.

(b) Coming to the second comet of the *Wakiât-i-Jehângiri*, we find that, it says that it appeared in the same year (Hijri 1027, A.D. 1618), sixteen days after the first comet. Both Hind and Ferguson speak, as said above, of a second comet in that year. But they say that it passed its perihelion on 17th August 1618, *i.e.*, about 3 months before the above-named comet of November 1618, while the Mahomedan author says that it followed sixteen days after.

In connection with this matter of difference between the Mahomedan writer and the later Christian writer, it is worth noting that, according to Hind, the observations of Kepler on the first of the two comets were "somewhat imperfect."³

From the description of the *Wakiât-i-Jehângiri*, one may be led to think, that the comet continued to appear for eight years. But as the *Ikbâl Nameh's* description of the same comet, which, to a certain extent, follows that of the *Wakiât-i-Jehângiri*, points out, the reference is to the supposed disastrous and unlucky influences of the comet. These were believed to have lasted for a long period of nearly eight years.

¹ "What are Comets and Meteors?"—*Fortnightly Review* of November 1909, pp. 919-20.

² "The Comets" by Russel Hind, p. 144.

³ *Ibid.*, p. 144.

Comets of 1705, 1003 and 1006.

I will supplement this account of the comets observed in India by Mahomedan historians with the following further account :—

- (1) An account of the comet observed in India in 1705 A.D. as given by an European writer.
- (2) An account of two comets observed between Hijri 1003 and 1006.

We find the following account of a comet observed in India in 1705. It is not from the pen of an Indian historian but from that of an European writer in the time of the later Mogal Emperors. The author is Mannuci. The account is taken from his “*Storia do Mogor,*” Vol. IV, p. 247. The writer says :—

“At the same time (in 1705-6) there appeared a comet which was visible for fifteen days. The Brahmans and astrologers found herein an occasion for talk, and they declared that these signs were demonstrations of Aurangzeb's (approaching) death and of devastation in many places in the Empire together with the loss of the post of Swat.”

Mannuci does not give the exact date of the appearance of the comet in India. But, after describing some events of the year 1705, he speaks of this event as happening “at the same time.” So, I think, it is the comet, which, according to Hind¹ and Ferguson, passed its perihelion on 30th January 1706. “It was observed at Paris by Cassini and Maraldi.”² As the 30th of January 1706 is the day of its perihelion or the nearest point to the sun, it is possible that it was seen in India some time before that day, probably at the end of 1705.

We find an account of two comets observed in Hijri 394 (A.D. 1003-4) and Hijri 396 (A. D. 1005-6) by Mahomedan writers. We have not the original Mahomedan writing before us, but we are indebted for this account to Dr. J. A. Condé, who has referred to them in his *History of the Dominions of the Arabs in Spain*. He thus speaks of the Comets—

“In this year of 394³ (Hijri) there appeared in the heavens a comet, or blazing star, of great magnitude and astonishing splendour.

“In the year 396⁴ there was witnessed a second phenomenon of similar kind ; a bright star, namely, which was seen in the heavens and was one of those which are accompanied by great thunders while

¹ Russel Hind's *Comets*, p. 127 ; Ferguson's *Astronomy* by Brewster, p. 361.

² Hind's *Comets*, p. 146.

³ A.D. October 1003-24.

⁴ 1005-6.

they run their course : this being one of the twelve notable ones mentioned by the most ancient observers. The learned watched the course of that star with much attention, and many were of opinion that none of this species ever appears unless when God the Highest, in His special providence, hath determined to bring about great changes in the world.”¹

These two comets are not referred to in the lists of Ferguson and Hind. Mr. Chambers² refers to a comet, of 1005, as one falsely identified by a writer in the Edinburgh Review of April 1835 as Halley's. I think, the second of the two comets referred to above, by Dr. Condé, on the authority of Arab writers, as appearing in 396 Hijri, is this comet of 1005 A.D.

List of the Comets.

We will here give a list of the comets, referred to in this paper, which will present to the reader, at one sight, the dates of their appearances and an idea of their identification. In giving the Christian dates of the Hijri years of the Mahomedan authors, I have followed the following rule :—

“ From the given number of Mahomedan years, deduct 3 per cent. and to the remainder add 621'54.” The corresponding rule for *vice versa* is—“ From the given number of Christian years, deduct 621'54 and to the remainder add 3 per cent. of the same.” Wollaston gives, at the end of his English-Persian Dictionary, a list of the Mahomedan years and their corresponding Christian years.

A List of the Comets referred to by the Mahomedan Authors named to in this paper.

The Book referring to the comet.	Hijri year.	Christian year.	My identification of the comet.
1. Maçoudi's Maruj-ul-Zahb	299	911-12	Halley's Comet in 912 A.D.
2. Ahmad <i>bin</i> Mahmud's Nigaristan.	330	941-42	Unidentified.
Arab writers according to Dr. Condé.	{ 394 }	1003-04	Do.
	{ 396 }	1005-06	It may be the comet referred to by Chambers as appearing in 1005.
3. Abul Fazl's Akbar Namah.	662	1263-64	The comet which passed its perihelion on 6th July 1264.

¹ History of the Dominion of the Arabs in Spain. Translated from the Spanish of Dr. J. A. Condé by Mrs. Jonathan Foster (1854), Vol. II, p. 49.

² The Story of the Comets, p. 124.

A List of the Comets—continued.

The Book referring to the comet.	Hijri year.	Christian year.	My identification of the comet.
4. Abul Fazl's Akbar Nameh.	803	1400-01	Unidentified. Perhaps it may be the remarkable comet of 1402.
5. Ditto ...	837	1433-34	The comet, which, according to Russel Hind, passed its perihelion on 4th or 5th November 1433.
6. (a) Abul Fazl's Akbar Nameh.	985	1577-78	The comet that passed its perihelion on 26th October 1577.
(b) Nizam-ud-din's Tabakat-i-Akbari.	...	.....
(c) Badaoni's Muntakhab-ul-Tawarikh.	...	.....
7. (a) The Wakiât-i-Jehângiri and (b) Ikbâl Nâme.	1027	1618	The comet that passed its perihelion on 17th August 1618.
8. The Wakiât-i-Jehângiri.	1027	1618	The comet that passed its perihelion on 8th November 1618.
Storia do Mogor ...	...	1705-6	The comet that passed its perihelion on 20th January 1706.

III.

AN INQUIRY INTO THE VIEWS OF THE MAHOMEDAN WRITERS ON COMETS.

We will now examine the statements of these Mahomedan authors at some length. All of them, with the exception of Abul Fazl, have mostly described the appearances of the comets, which fell under their own observations or whose observations were noticed by some previous writers whose descriptions they followed. It is Abul Fazl alone, who, not only describes the appearances of the comets, but enters into a kind of dissertation about the theory of their formation, &c. So, we will examine his statement, and, where necessary, see, how far he is supported by other Mahomedan authors, by other ancient writers and by modern scientific writers.

ABUL FAZL'S THEORY EXPLAINING THE PHENOMENON OF THE APPEARANCE OF A COMET.

Abul Fazl connects the phenomenon of the appearance of a comet with the formation of what he calls *bokhâr*, *i.e.*, vapour and *dakhan*, *i.e.*, steam. To speak of it in the modern scientific phraseology, he

connects it with the phenomenon of evaporation. He says, that its appearance is due to the vapour floating in the air, as the result of the process of evaporation. But, though the vapour is thus always in the air, the appearance of the comet is rare. So, to explain that, he says that its appearance in the heavens is due to a particular position of the planets, Mars and Mercury in the heavens.

A comparison with the modern view.

As to the theory about the presence of vapours in the comet, we find that modern scientists also refer to them, and say that the luminosity is due to them. Sir George Gabriel Stokes¹ says on this point :—

“ There can no longer be any doubt that the nucleus consists, in its inner portions at least, of vapour of some kind, and we must now add incandescent vapour ; nor does there appear to be any reasonable doubt that in most comets this vapour consists of or contains some volatile compound of carbon, unless it be carbon itself vaporized by the heat of the sun. . . . Now it is conceivable, that if the nucleus of a comet be endowed with an atmosphere, or perhaps even coated with a liquid, having in a high degree the combination of the transparent and athermanous characters of glass, its temperature when exposed to radiation from the sun might rise much above what we might have expected *a priori*.”

Though Abul Fazl's reference to vapours in the comet is correct, even from the modern scientific point of view, his inference that the vapour is the vapour rising from our earth is wrong. He takes it to be an ordinary meteorological phenomenon which is not correct, as the comet appears in the ultra-terrestrial regions. Abul Fazl refers to terrestrial evaporation, while according to the modern view, it is the evaporation of a volatile liquid in the ultra-terrestrial region. The *Ikbâl-nâmeh-i-Jehangiri*² also connects the phenomenon with a vapourous matter in the atmosphere. The *Wakiât-i-Jehangiri* also speaks of “ a luminous vapour.”³

It is one of the features which a comet generally assumes, that seems to have led Abul Fazl and others to understand that it is a terrestrial meteorological phenomenon. As pointed out by Prof. Newcomb,⁴ one of the three features which a comet embodies is that of the

¹ Nature Series. “ Burnett Lectures on Light,” by Sir George Gabriel Stokes (1892), pp. 210-213.

² Elliot's History of India, Vol. VI., p. 406.

³ Elliot's History of India, Vol. VI., p. 363.

⁴ “ Astronomy for Everybody. A Popular Exposition of the Wonders of the Heavens ” by Prof. Simon Newcomb, with an introduction by Sir Robert S. Ball (1903), p. 255.

nucleus, which is surrounded by "a cloudy nebulous mass like a little bunch of fog, shading off very gradually towards the edge." The comet "looks like a star shining through a patch of mist or fog." So, it is this misty or foggy appearance that seems to have led Abul Fazl and others to conceive the appearance of a comet to be a terrestrial phenomenon occurring within the limits of the strata of the earth's atmosphere.

Thus Abul Fazl and some other Mahomedan authors partially reflect the views of the early ages of science referred to by Ferguson. He says :—"In the early ages of science, the comets were regarded as an assemblage of small stars that had accidentally coalesced into one body, and afterwards they were believed to be simple meteors or exhalations generated by inflammable vapours in the earth's atmosphere."¹

The view that the comets are atmospheric phenomena was held upto as late as Tycho Brahe's time. Astronomer Heath thus speaks on this point : "The ancient philosophers believed that comets existed in the earth's atmosphere. This idea was first exploded by Tycho Brahe, who showed by actual measurements that the comet of 1577 moved in space at a distance from the Earth farther away than the Moon, and therefore far beyond the confines of the earth's atmosphere."²

Abul Fazl's view about the forms assumed by the comets.

While explaining the origin of the appearance of the comet, Abul Fazl speaks of the various forms which the comets assume. He says that the comets assume the following forms :—

- (a) A man with locks of hair.
- (b) A person having a tail.
- (c) A person holding a lance in his hand.
- (d) An animal.

(a) The first form mentioned by Abul Fazl, *viz.*, that of a person with locks, is that which is also referred to by modern scientific writers on comets. They say that the nucleus or the central nebulous mass is surrounded by a hairy mass. The very word "comet" is derived from "coma," the Latin word for hair, because it looks hairy. This hairy portion is called "coma." The nucleus and the coma together form what is called "head." We find that the use of the word "head" for a part of the body of the comet which is hairy is

¹ Ferguson's Astronomy by Dr. Brewster (1811), Vol. II, pp. 354-55.

² The Twentieth Century Atlas of Popular Astronomy, by Thomas Heath (1903), p. 93.

ancient. The *Bundehesh*, a Pahlavi book of the Parsees speaks of the head and tail (*royashman va dumb*) of a comet.

One of the several Persian words for a comet is *zuzu'âbe*, *i.e.*, the possessor of locks of hair. A story is told of Professor Barnard showing a photograph of a comet to a lady. On looking to it, she is reported to have said : " Why ! that comet looks as if it had been out all night " ² ! The remark can be more true from the point of view of the hairy portion of its head than from that of its tail.

(*b*) The second form of the comet referred to by Abul Fazl is that of a person with a tail. One of the several Persian words for a comet is "zuzanâb," *i.e.*, the possessor of a tail. Our general notion of a comet is that it is a tailed star, and that, as such, it always carries a tail. So Abul Fazl's distinction between the comets, as those with locks of hair or hairy comets, and tailed comets, appears strange at first thought. But we must remember that, at times, the comet is not seen in all its perfection. At times, the nucleus or the part which forms the hairy portion is not seen at all, and at other times, it is the tail that is not seen at all. Prof. Newcombe says on this point : " Comets differ enormously in brightness . . . Sometimes a telescopic comet has no visible tail ; this however is the case only when the object is extremely faint. Sometimes, also, the nucleus is almost wholly wanting." ³ Again, we must remember that the observations in India in the time of Abul Fazl (1551-1602 A.D.) were made with naked eye and not with telescopes. The *Wakiât-i-Jehangiri* while speaking of a comet in the time of Jehangir, the successor of Akbar, in 1618, also says that in its tail " there was no light or splendour." ⁴

According to Badaoni, the author of the *Muntakhab-ul-Tawârikh*, the tail of a comet, which had appeared in 985 Hijri (1577-78 A. D.) in the reign of King Akbar (1542-1605 A.D.), had suggested a joke in the case of a courtier. Shah Mançur, who occupied the post of *Divân*, used to keep the end of his turban hanging behind him over his head. The recent appearance of the comet at that time suggested the idea that the end of the turban hung over the back of his head like the tail of the comet. So, in joke, he was called *Sitârah-i-dunbaleh* (ستاره دنباله) ⁵ *i.e.*, a tailed star or comet.

¹ Chap. XXVIII, 44. S. B. E., Vol. V. (1880), p. 113.

² " Modern Astronomy," by Turner (1901), p. 226.

³ Newcombe's *Astronomy for everybody*, p. 256.

⁴ Elliot's *History of India*, Vol. VI., p. 364.

⁵ The *Muntakhab-al-tawarikh* edited by Dr. Lees and Munshi Ahmed Ali (1865), Vol. II., p. 240, l. 18. Lowe's Translation (1884), Vol. II, p. 248. Elliot's *History of India*, Vol. V, p. 407, n. 3.

(c) The third form attributed by Abul Fazl to a comet, *viz.*, that of a person with a lance (nizeh) in his hand, is one which is not referred to by modern scientific writers on comets, but is referred to by Pliny.¹ Other Mahomedan authors, besides Abul Fazl, have attributed to comets forms of instruments. The Wakiât-i-Jehangiri, while speaking of a comet that appeared in the 13th year of the reign of Jehangir (Hijri 1027, A. D. 1618) says, that it appeared "like a spear with the two ends thin but thick about the middle."² The Ikbâl-nameh-i-Jehangir also speaks of the form as that of a javelin.³

Some European writers also refer to the comet as assuming the forms of instruments. For example, Sigebert says of the comet that appeared in 1066, the year of the Norman conquest, that to its train "hung a fiery sword not unlike a dragon's tail."⁴ In another place we read of a comet appearing like a Turkish scimitar.⁵

(d) The fourth form supposed to be assumed by the comets, according to Abul Fazl, is that of an animal. The Pahlavi Bundehesh also seems to refer to this form.

Pliny⁶ refers to the following forms assumed by the comets:—Sword, dart, horn, deity in a human form, spear, spire, knot of fire, and flute.

IV.

THE INFLUENCE ATTRIBUTED BY THE PEOPLE TO A COMET'S APPEARANCE.

Mr. Vincent Heward, in his "Story of Halley's Comet,"⁷ says of Halley's comet that "it is closely associated with events which have contributed largely towards moulding the destiny of Europe." One can say that that statement is true, to a greater or less extent, of many great comets. Abul Fazl's statement about the beliefs in a comet's influence is a reflection of the general beliefs on this subject.

Abul Fazl's version of the influence of the comets.

Abul Fazl, on the authority of ancient writers, whom he calls "writers of wisdom," says that as a result of the evil influences of a comet "a famine is in sight, sickness is prevalent and calamities gain strength." Further on, he refers to the dethronement of kings, &c. If by the "writers of wisdom" he means the *pishinigân* or "the

¹ Pliny's Natural History. Book II, Chapter XXII. Bostock and Riley's translation (1855). Vol. I, p. 56.

² Elliot's History of India, Vol. VI., p. 363.

³ Ibid, p. 406.

⁴ The Story of Halley's Comet. The Nineteenth Century of September 1909, p. 519.

⁵ Ibid, p. 520.

⁶ Pliny's Natural History. Book II, Chapters XXII and XXIII. Bostock and Riley's translation, Vol. I, pp. 55-58.

⁷ The Nineteenth Century of September 1909, No. 391, p. 509.

ancients" referred to by him in another passage, we will see, later on, that the Pahlavi Bundelesh refers to all these calamities mentioned by Abul Fazl. We find from other Mahomedan authors also that the fear about the evil influences of the comets was well nigh general.

Its comparison with other similar views.

The following statement of Ferguson is a reflection of what, according to Abul Fazl, was the general belief of those and earlier times. Ferguson says :—"During the ages of barbarism and superstition, they were regarded as the harbingers of awful convulsions, both in the political, and in the physical world. Wars, pestilence and famine, the dethronement of kings, the fall of nations, and the more alarming convulsions of the globe, where the dreadful evils which they presented to the diseased and terrified imaginations of men Even at the beginning of the 18th century, the friend and companion of Newton, Mr. Whiston, regarded them as the abode of the damned."¹

There are a number of theories about the origin and cause of the Deluge. One of these is, that it must be due to a comet which may have come into collision with the earth. Ferguson and also Dr. Whiston, an astronomer and a contemporary and friend of Newton, held this view. Ferguson says as follows on this point :—"We must confess that if a natural cause is to be sought for that great events, we can explain it only by the shock of some celestial body. The transient effect of a comet passing near the earth, could scarcely amount to any great convulsions ; but if the earth were actually to receive a shock from one of these bodies, the consequences would be awful. A new direction would be given to its rotatory motion, and the globe would revolve round a new axis. The seas, forsaking their ancient beds, would be hurried by their centrifugal force to the new equatorial regions ; islands and continents, the abodes of men and animals, would be covered by the universal rush of waters to the new equator, and every prestige of human industry and genius at once destroyed. The chances against such an event, however, are so very numerous, that there is no dread of its occurrence."²

Halley is reported to have said of the comet that bears his name that "if so large a body with so rapid a motion were to strike the earth—a thing by no means impossible—the shock might reduce this beautiful world to its original chaos."³

¹ Ferguson's Astronomy by Dr. Brewster (1811), Vol. II, p. 352.

² *Ibid*, p. 353.

³ The Nineteenth Century of September 1909, p. 513.

It seems, that the very mention, by those, whom Abul Fazl calls "writers of wisdom," of the chances, however remote, of a catastrophe has led many men, even of the intelligent class, to be afraid of the phenomenon. It has led them to prayers and ceremonies to avert such misfortunes. They attributed their escape to their devout prayers. Though they believed that the general disaster was averted, they attributed partial disasters, like that of an invasion or of a dethronement, a famine or a pestilence, to that phenomenon. It was not only in India and Persia that such a fear was general. We find that it was common in many nations, both ancient and modern. Abul Fazl in his account of the comets refers to ancient Greece, Egypt and Rome. All these countries had superstitious fears of these comets. Among the Greeks, Aristototele, among the Romans, Ammianus Marcellinus and Pliny, and among the Egyptians, Ptolemy refer to this.

Ammianus Marcellinus is reported to have said that "comets foretold the ruin of great conditions,"¹ Pliny devotes two chapters (Bk. II, chaps. 22 and 23) to comets.² He divides them into several classes according to their form and appearance. In his long description of their form and appearance we find the following traits referred to by Abul Fazl:—

- (1) "Shaggy with bloody locks and surrounded with bristles like hair." Some "have a mane hanging down from their lower parts like a long beard."
- (2) "They shine like a sword." "One had the appearance of a spear."
- (3) "It portends something unfavourable".³ These unfavourable prognostications depend upon the different forms and appearances that it assumes.

According to Ptolemy, referred to by Abul Fazl, "comets presented an omen especially unfavourable to kings."⁴ Milton is believed to refer to this opinion when he says of a comet in his *Paradise Lost*, "And with fear of change perplexes monarchs." Milton also refers to the belief referred to by Abul Fazl that pestilence and wars result from the appearance of a comet.⁵

Pliny refers to a comet that appeared in the time of Cæsar (44 A.D.). Halley has identified this comet with that of 1680 A.D. whose

¹ Encyclopædia of Antiquities by Rev. Fosbroke (1825), Vol. II, p. 675.

² "The Natural History of Pliny," translated by Bostock and Riley (1855), Vol. I, pp. 55-58.

³ *Ibid.*, p. 57.

⁴ *Ibid.*, p. 57, n. 4.

⁵ *Vide* above p. 85. *Paradise Lost*, Bk. II, ll. 708 *et seq.*

appearance is said to have led both Newton and Halley to believe that "the comets were perhaps controlled in their movements by the same influence as that which * * * * held the moon in its orbit."¹ It was the study of the observations of this comet in 1680 that led Halley to observe and study more carefully the comet which appeared in 1882, whose next appearance is foretold and which is known by his name.

Gibbon², on the authority of Halley and others, gives an account of the different appearances of the comet of 44 A. C. referred to by Pliny. It has the period of 575 years. While speaking of its appearance in the time of Justinian, Gibbon says that "the nations, who gazed with astonishment, expected wars and calamities from the baneful influence, and these expectations were abundantly fulfilled."³ Gibbon enumerates its following appearances :—

1. Its appearance in 1767 B.C. is connected with the tradition which Varro has preserved that under the reign of Oxyges, the father of Grecian Antiquity "the planet Venus changed her colour, size, figure and course."⁴
2. Its second appearance in 1193 B.C. "is darkly implied in the fable of Electra, the seventh of the Pleiades, who have been reduced to six, since the time of the Trojan war. That nymph, the wife of Dardanus, was unable to support the ruin of her country; she abandoned the dances of her sister orbs, fled from the Zodiac to the North Pole, and obtained from her dishevelled locks the name of the comet."⁵ From this description, we find that the comet is classed as a nymph, just as it is styled as a *pari* (fairy) in the Avesta and Pahlavi writings, as will be seen later on.
3. The third appearance was in 618 B.C., "a date that exactly agrees with the tremendous comet of the Sybill, and perhaps of Pliny."⁶
4. The fourth appearance was in 44 B.C. when it appeared as a long-haired star in Rome. It was believed to have "conveyed to heaven the divine soul of the dictator (Cæsar)."⁷

¹ "The Story of Halley's Comet" by E. V. Heward in the *Nineteenth Century*, No. 391, September 1909, p. 509.

² *The Decline and Fall of Roman Empire* (1844), Vol. III, p. 160.

³ *Ibid.*

⁴ *Ibid.*

⁵ *Ibid.*, pp. 160-161.

⁶ *Ibid.*, p. 161.

⁷ *Ibid.*

5. The fifth appearance was, as said above, in 531 A.D., in the reign of Justinian.
6. The sixth appearance was in 1106 A.D. Even the Chinese have a record of this appearance. This was the time of the Crusades, and both the Crusaders and the Saracens took omens from its appearance.
7. The last appearance was in 1680 A.D.

V.

**THE VIEWS OF THE PISHINIGAN, I.E., THE ANCIENT
PERSIANS, AND THEIR NIRANGS REFERRED
TO BY ABUL FAZL.**

Abul Fazl, in his long account of the comets, refers to the *Pishinigân* or the ancients and says that they had many *nirangs* to counteract evil influences like those resulting from the appearances of comets. Let us examine here, in a separate section, the following points on this subject :—

A.—Who were the *pishinigân* ?

B.—What were their *nirangs* ?

C.—What had the *pishinigân* to say about the comets ?

A.—Who were the *pishinigân* ?

The *pishinigân* or the ancients, referred to by Abul Fazl, were the ancient Persians who professed the Mazdayaçnâñ faith. In the Pahlavi Dinkard ¹, the *pishinigân* are identified with the *poriyo-tkaêshan*. This word is used in the Persian translation from the Pahlavi of the letter of Tosar or Tansar, the Chief Priest and Prime Minister of the Court of Ardeshir Babagân, the founder of the Sassanian dynasty, to Jasnafshah, the king of Tabaristan.

Tansar has used this word, ² as well as the word *avalâyân* ³ اوليان in the sense, as Darmesteter ⁴ has said, of *porio-tkaêshân*, who were the ancient Mazdayaçnâñs of Persia of the time of Zoroaster.

B.—What were the *nirangs* of the *pishinigân* ?

The word *nirang* used by Abul Fazl is originally a Pahlavi word. Darmesteter says that “Nirang est le terme pehlvi pour les actes

¹ The Dinkard by Dastur Dr. Peshotan Behranji Sanjana, Vol. IX, Pahlavi text, p. 451, l. 20. Vide the Zand Pahlavi Glossary by Dastur Hoshang and Dr. Haug, Introduction, p. xxxv, l. 2.

𐭮𐭲𐭮𐭲𐭮𐭲𐭮𐭲 𐭮 𐭮𐭲𐭮 𐭮 𐭮𐭲𐭮 𐭮𐭲𐭮 Poriyo-tkeshân-i-pishinigân. Vide also the text of the Sad-dar-i Behere-i-tavîl, Chapter XIII, wherein King Jamshed is spoken of as one of the *pishinigân*.

² Journal Asiatique. Neuvième Série. Tome-III, Mars-Avril, 1894, p. 212, l. 3.

³ *Ibid*, p. 211, l. 12.

⁴ *Ibid*. Mai-Juin 1894, pp. 514-15.

liturgiques et par suite pour les indications liturgiques.¹” The word signifies more than this. It has the following different significations—

- (1) Ritual.
- (2) A prayer formula used on particular occasions and in particular ceremonies.
- (3) A prayer formula used as a charm or amulet for averting an evil.

As an example of the use of the word in the first sense, the Parsees have a ritual or ceremony called Nirangdin or nirang-i-din (lit. the ritual of religion). It is a long ceremony for the consecration of the *Gaó-mez* or the urine of a sacred bull. From the name of the ceremony, urine itself is at times called *nirang*. Again, there is a Pahlavi book which is called Nirangistân, because it refers to rituals.

Origin and meaning of the word ‘nirang.’

I think that the Pahlavi word *nirang* is another reading of the Pahlavi word *nirui* 𐬨𐬀𐬭𐬀 or *niru* 𐬨𐬀, which is Persian *niru* (نیرو), meaning strength or power. The same Pahlavi word that can be read *nirui* is read *nirang*. A *nirang*, whether it is a ritual, a prayer formula, a charm or amulet, or an incantation, gives to its performer, possessor, or reciter, power or strength, especially mental power or strength, as the result of faith.

In the Pazend Âfrin-i Gâhambâr² and in the Âfrin-i-Ardâfarvash, we find the word *niru* in the sense of strength used with cognate words. We read there “*Aoj, zur, niru, tagi, amavandi, pirozgari hama fravash-i ashoân be-rasād*” *i.e.*, “May the strength, vigour, power, force, success, victory all reach the holy spirits of the pious³.” This word *niru* when it occurs similarly in the Âfrin-i Rapithavin occurs as *nîru-i*. The sentence runs thus :—“*Pa aoj, va zor vu niru-i varz pirozgar-i Dadar Ahura Mazda,*”⁴ *i.e.*, “With the strength and vigour and power of the triumphant splendour of Dadar Ahuramazd.” This word *nir i* 𐬨𐬀 as written here, may be clearly read *nirang*.

1 Le Zend Avesta, I Introduction, p. 89.

2 The Text of the Fravashi, Afringâns and Afrins published by Ervad Tehmuras Dinshaw Anklesaria (1883), p. 196. Afrin-i Gahambar 4.

3 *Ibid* p. 178. Darmesteter translates this sentence thus :—“Que la vigueur, la force, la puissance, la fermeté, l’ascendant victorieux viennent aux Fravashis des saints”! (Le Zend Avesta III, p. 181).

4 Mr. Tehmuras’s Text, p. 223 Afrin- Raphithâvan 21.

Dr. Steingass¹ gives a Persian word 'niruyish' **نیرویش** as meaning "Divine decree, fate," and by putting a mark of interrogation before it, seems to have some doubt about the word. I think this word is the same as "nirui" which, in the above passage, is associated with Divine splendour. The final *i* (ي) which forms abstract nouns in Persian is written in Pahlavi and Pazend with a letter **ود** which can be read both "sh" and "ya or ih." For example, the Persian "shâdi" for joy, which is Avesta "shâiti," is written in Pahlavi "shadih" **شادی**. But, in the Pazend, the word is written and read "shadish." We have a number of such readings of abstract nouns in the Pazend *Áfrin-i Haft Ameshashpandan*.² So, Dr. Steingass's Persian word "niruyish" is nothing but *nirui*, which has originated the word "nirang."

From this short examination of the etymology and meaning of the word, we see that the word "nirang" has acquired the sense of incantation, charm, &c., because it gives power or strength to those who have faith in its recital.

A few Parsee Nirangs.

We have a number of *nirangs* still existing among some of the Pazend and Persian books of the Parsees³, intended to be recited on certain occasions to avert certain maladies, evils and evil influences. I have given some of the *nirangs* in my papers⁴ before the Anthropological Society of Bombay. Among the *nirangs* that now exist, we do not find any special *nirang* enjoined to be recited on the appearance of a comet. But it seems certain, that latterly, in ancient Persia, some of the natural phenomena were believed to bring with them some calamities. As I have said in my paper on "A few ancient Beliefs about the Eclipse and a few Superstitions based on these Beliefs,"⁵ "it was usual among the Parsees, until a few years ago, to say prayers on such occasions and to recite especially the *Mahbokhtar Nyâish* in the praise of the moon during lunar eclipses. Mr. Gaspard Drouville⁶ said of the Zoroastrians in Persia in the early part of this century that "Ils adressent leurs prières au soleil, et les jours d'eclipse sont pour eux jours de désolations et de deuil ;

1 Persian-English Dictionary, p. 1441.

2 *Afrin-i Haft Ameshaspand* 15. Ervad Tehmuras's text, p. 191.

3 *Vide* Revayet of Dârâb Hormazdyâr, Bombay University Library Manuscript, Vol. I., folios 155-165.

4 (a) Charms or amulets for some diseases of the Eye. *The Journal of the Anthropological Society of Bombay*, Vol. III (1894); p. 338 *et seq.* (b) *Nirang-i Jashan-i Burzigarân*. *Ibid.*, Vol. V. (1900) p. 398. (c) Incantations for cutting the hair and the nails. *Ibid.* Vol. VIII.

5 *Journal of the Anthropological Society of Bombay*, Vol. III, No. 6, p. 360.

6 "Voyage en Perse" faites en 1813 Tome II p. 193.

ils se posterent alors la face contre terre et ne se relevent qu'au retour des rayons de cet astre."

We will see further on, that the comets were believed, as it were, to belong to the class of *paris* or fairies. So we have several Parsee *nirangs* still existing, and still recited by many—though not on occasions of the appearance of comets only—in which *paris* (fairies) are mentioned, and it is prayed that their influence may be averted. One of these *nirangs* is that known as the "Nirang of the Vanant Yasht." The other is that known as the "Nirang of the Haoma Yasht."¹ The third *nirang* of this kind is the "Nirang-i-kusti,"² *i.e.*, the prayer recited on putting on the sacred thread. The fourth is that known as the "Nirang-i-dur kardan-i-zulum-i divân va darujan"³, *i.e.*, the incantation for averting the oppressive influence of the Demons and Drujs.

C.—What have the pishinigân to say about the comets ?

Now, we come to the third part of this section. Let us examine here briefly what the Pahlavi books of the *pishinigân* or the ancient Persians have to say generally on the subject of the comets. Before considering this subject, we must, first of all note, that in the Pahlavi Bundesh, wherever the comets are referred to, they are generally referred to, together with the meteors.

Meteors and comets classed together in Pahlavi books.

Almost all scientific writers of the present day treat of comets and meteors in the same chapter or division.⁴ They think of these as being two phenomena of well nigh the same kind. Some of the meteoric showers are believed to be the disintegrated parts of a comet. For example, the Perseides are believed to be connected with Swift's Comet or the Comet III of 1862. The Andromedes are believed to be the disintegrated portion of Biela's Comet. The Lyrids are connected with the Comet I of 1861. The Leonides are connected with the comet known as the Temple.

Prof. Newcomb connects these together, and while speaking of them under the heading "Connection of Comets and Meteors" says :—

"These objects had originally formed part of the comet and had gradually separated from it. When a comet is disintegrated . . . those portions of its mass which are not completely dissipated

¹ *Vide* Spiegel's Avesta translated by Bleeck. Khordeh Avesta, Vol. III., p. 199. LXV. *Vide* the Pazend Texts, edited by Ervad Edalji Kerhaspji Antia and published by the Trustees of the Parsee Panchayet of Bombay, p. 174.

² Spiegel *Ibid.* p. 4.

³ *Vide* the Pazend Texts edited by E. K. Antia, pp. 181—182.

⁴ The Twentieth Century Atlas of Popular Astronomy by Thomas Heath (1903), Chap. XIII, p. 92.

continue to revolve around the sun as minute particles, which get gradually separated from each other in consequence of there being no sufficient bond of attraction, but they still follow each other in line in nearly the same orbit."¹

Reference to the Comets in the Bundehesh.

The Pahlavi Bundehesh, though it does not specifically refer to any connection between comets and meteors, speaks of them together. At times, both these bodies are mixed up together. It refers to the comets in chapters V, 1 ; XXVIII, 44, and XXX, 18, 31.

The fifth chapter, which is a chapter on a part of Astronomy, after speaking of the planets, speaks of two heavenly bodies as "*Gurcheher va dusdo mushpar dumbhomand.*" Dr. West translates these words as "Gocheher,² and the thievish Mushpar provided with tails." Here the word 'Gocheher' may, as suggested by Dr. West, refer to meteors. The word 'Mushpar' from its epithet *dumbhomand*, *i.e.*, "with tails," is evidently for the comet. For this heavenly body of Mushpar (comet) it is added "The sun has attached Mushpar to its own radiance by mutual agreement, so that he may be less able to do harm."³

In the 28th chapter we have the words "Gocheher royashman va dumb va mush parik-i dumbhomand," *i.e.*, Gocheher, head and tail, and the tailed mush-parik. Here, we find that both the words "Gocheher" and "mush-parik" refer to comets. The words "head and tail" attached to Gocheher show that the word "Gocheher" also refers to the comet.

Then we find two more references to Gocheher in the 30th chapter of the Bundehesh. In the first place, it says "*Gucheher chegun dayan sepeher min tahi binâ barâ val samik nafrunet.*"⁴ Dr. West thus translates the sentence:—"As Gochihar falls in the celestial sphere from a moon beam on to the earth."⁵ Here, he takes the word "Gochihar" as referring to a meteor. But Windischmann reads the word as "Gurzcheher" and translates it as "Komet Keulenkoph," *i.e.*, "a club-headed comet." Justi, reading it Gurcheher says of it, that it is "the name of a comet" (name eines Kometen).

Again, we read in the same chapter (Chap. XXX, 31). "*Gocheher mâr pavan zak ayokshest vatakhntah suszet*", *i.e.*, "Gocheher burns the serpent in the melted metal."

¹ Prof. Newcomb's Astronomy for everybody, pp. 281-282.

² S. B. E., Vol. V. (1880), pp. 21-22.

³ *Ibid* p. 22.

⁴ *Vide* my Bundehesh, p. 158.

⁵ S. B. E. V., p. 125, Chap. XXX, 18

Pahlavi words for Comets.

From all these references in the Bundeshesh, we find that the comets are known as "Gocheher" and "Mush" or "Mush-parik."

As to the word Gocheher, we find that the word itself varies in various manuscripts, and, even when written in the same way in some manuscripts, it is read by scholars in various ways, because some of the letters of the Pahlavi alphabet admit of various readings. Taking both these facts into consideration, we find that the word can be, and is, read as: Gochihar, Gurchihar, Gurgchihar, Gurzchihar, Durchihar, Gurzdâr, Gurgdâr. The words may respectively mean "cow-faced, boar-faced, wolf-faced, mace or club-faced, far-faced, club-keeper, wolf-keeper." Some of the several words for a comet in modern Persian, as given by Richardson in his English-Persian Dictionary, are juzahr (جوزهر) guzchahar (گوزچهر), guzchaharah (گوزچهره). Dr. Steingass in his Persian-English Dictionary gives the words gauz-chahar (p. 1102 گوزچهر) and jauzahr (p. 378 جوزهر) for a comet. Nizam-ud-din in his Tabakat i Akbari gives the word "dur-danê" (دوردانه) for a comet. All these are then derived from the Pahlavi word "Gurchihar" which can be, and which is, read variously. All the Persian words for a comet settle one thing, *viz.*, that the Pahlavi word "Gurchihar" and its equivalent readings in the Bundeshesh refer more generally to "comets" than to "meteors."

Now, coming to the meaning of the Pahlavi word, we find, that the "comet" has derived its name, either from its apparent form of an animal,—like the cow, boar, or wolf—or of an instrument like the mace or club. These Pahlavi words then show that Abul Fazl, when he said that the comet assumed the forms of animals or of instruments like the spear or javelin, had the support of the Pahlavi writings—the writings of the ancient Persians whom he called the *pishinigân*, *i.e.*, the ancients.

Coming to the second word in Pahlavi for a comet, *viz.*, Mush-par, we do not find, that it has given an equivalent word to Persian for a comet. The word occurs twice in the Bundeshesh (Chap. V, 1, 2 and Chap. XXVIII, 44). That the word is used for a comet is evident, because it has the appellation *dumbhomand*, *i.e.*, "with a tail" attached to it in both the places. As the words "*royashman va dumb*," *i.e.*, "head and tail" are attached to the word *Gochihar*, and as the word

“dumbhomand,” *i.e.*, “with tail,” is attached to “Mush-par,” I conclude that the Pahlavi writers divided comets into the following two classes :—

- (1) Those which were quite distinct, and which appeared both with their heads (or to speak in the modern scientific language with their nucleus and coma) and their tails.
- (2) Those which appeared rather indistinct, *i.e.*, those whose tails only appeared.

I think Abul Fazl's division of the comets into two classes, *viz.*, (1) the Zawât'l-azwáb, (or zuzvabê), *i.e.*, those with locks of hair and (2) the Zuzanáh, *i.e.*, those with tails, corresponds to the above division of the Pahlavi Bundesh, *viz.*, the *Gochihar* and the *Mush-par*.

As to the meaning of the word *Mush-par*, it is difficult to settle it. In an old text of the Bundesh, in one place (Chapter XXVIII, 4), the word is given as *Mush-parik*.¹ This *Mush-par* or *Mush-parik* is the *Mush-pairika* of the Avesta (Yaçna XVI 8, LXVIII 8) where the words *Mush* and *pairika*, seem to have been used as two separate words. The Avesta word *pairika* is the same as Pahlavi *parik* Persian *pari*, English *fairy*. Thus, we find, that “*Mush*,” the Avesta and Pahlavi word for a comet, has the word *pairika* or *parik* or *par* meaning *fairy*, attached to it, both in the Avesta and in the Pahlavi. Similarly, we find that the “*Meteors*” which belong to the same class of bodies as the “*Comets*,” are referred to in the Avesta (Tir Yasht 8), as belonging to a class of *fairies*.

It appears from some of the Pahlavi books, that at one time, the ancient Persians distinguished between the Sun, the Moon and the Fixed Stars on the one hand, and the planets, the comets and meteors on the other hand. The former belonged to the class of the creation of Spenta Mainyu, *i.e.*, the Good Spirit, and the latter to that of the creation of the Angra Mainyu, *i.e.*, the Evil Spirit.² In the Pahlavi Zadsparam (chap. IV, 3) the planets are represented as being opposed to the Sun and the Moon. The reason, why the Sun, the Moon and the Fixed Stars are represented as belonging to the creations of the Good Spirit, and the planet and the comets and meteors to those of the Evil Spirit, seems to be this : What is orderly and systematic is said to move in the path of Asha, *i.e.*, Righteousness and Order. What is disorderly and unsystematic is opposed to Asha and is said to move in the path of the Dravant, *i.e.*, the wandering. Now “*Planets*” as their very English word (from its Greek root signifying to

¹ S. B. E., Vol. V (1880), p. 22 n. 1.

The Bundesh, Chap. XXVIII, 43-45 ; S. B. E., Vol. V (1880), pp. 113-114.

“wander”) implies, are “wandering stars,” as compared with the “fixed stars.” So they are represented to belong to the class of the Evil Spirit.

The fairies, according to the ideas of the ancient Persians, belonged to the class of the creations of the Evil Spirit. Pairik, Parik, Par or Pari, the Iranian words for a ‘fairy’ come from a root “par” meaning “to tempt, to enchant.” The English word ‘fairy’ also comes from a similar root (fiér to enchant). Thus, the wandering bodies of comets and meteors were termed ‘fairies’ as belonging to the class of the creatures of the Evil Spirit.

This idea of considering the planets and the comets and meteors as belonging to the class of the Evil Spirit seems to be a later one. It does not seem to be early Avestaic. This appears from the very names of the planets. They all bear the names of some of the Yazatas or good beings named in the Avesta. For example, the planet Jupiter is called Ormazd (Ahura Mazda). Mars is called Beharâm (Verethragna). Venus is called Nâhid (Anâhita). The Oulamâ-i Islam¹ says that Ahura Mazda had given these planets good names. Thus the idea of attributing evil influences to the meteors and comets, which we see in later Pahlavi books and in the Persian books of Mahomedan authors, seems to be a later one.

We find a reference to the comets (Mush-pairika) in the Avesta also. They are referred to in the (Yaçna XVI 8, LXVIII 8). The Pahlavi translators of the Avesta render Mush-Parika by Mushparik.² The Persian rendering of this is “mush yani pari harâmzâd³” *i.e.*, Mush, which is the ill-born fairy. In the above Yaçna, we find faint allusions to the belief that the appearances of the comets were opposed to the prosperity of a country.

Now, as to the word Mush, which forms the first part of the word Mush-parika, Mush-parik or Mush-par, it comes from the Aryan root “mush” to injure. This word seems to be the same as Persian Mush (موش), English “mouse.” So, perhaps one may take it, that one of the animal forms, which, the comet, according to Abul Fazl, was believed to assume, was that of the “mouse.” Prof. Harlez derives the word from the root “mush” to steal, which we find in the Sanskrit word, *mushnâmi*, *i.e.*, a thief. If we take that to be the proper root of the word, the Pahlavi word “duzina” (Persian duzd دزد)

¹ Fragments, relatifs à la Religion de Zoroastre. Extraits des Manuscrits Persans de la Bibliothèque du Roi (Paris 1829) p. 5. *Vide* M. Blochet's article “Le Livre Intitulé L'oulama-i-Islam” in the “Revue de l'Histoire des Religions (1898).

² Spiegel's Pahlavi Yaçna, p. 96, l. 1 (mush-parir).

³ My manuscript of the Avesta-Pahlavi-Persian Yaçna, Vol. I, p. 188.

i.e., a thief, which we find applied to Mush-par in the Bundelesh, supports that assumption. Dr. Mills asks:—"Is it possible that a plague of mice is meant, *mush* being here undecidable?" This reminds us of what is said in the abovementioned Mahomedan work, the "Ikbal nameh-i-Jehangiri." There, in the account of the phenomenon of a comet that appeared in the 13th year of King Jehangir, it is said:—"In the environs and dependencies of the city, the mice had increased to such an extent that they left no trace of either crops or fruits. With the greatest difficulty, perhaps, only one-fourth of the produce was saved to the cultivators. In the same manner, the fields of melons, and the produce of orchards and vineyards were totally destroyed; and when no fruit and no corn remained in the gardens and in the fields, by degrees the mice all died off."¹

The Bundelesh (Chap. V.) says of the comet that "the sun has attached Mush-par (*i.e.*, the comet) to its own radiance by mutual agreement, so that he may be less able to do harm."² This statement refers to the movement of the comet round the sun, alluded to by Abul Fazl and referred to by modern scientific writers, who say that moving under the influence of the sun, it always describes a conic section, the curve of which is in the form of an ellipse, a parabola or an hyperbola.

The evil influences believed to be resulting from the appearance of a comet as mentioned by Abul Fazl are thus referred to in the Bundelesh:—"By them these ten worldly creations, that is, the sky, water, earth, vegetation, animals, metals, wind, light, fire, and mankind, are corrupted with all this vileness; and from them calamity, captivity, disease, death, and other evils and corruptions ever come to water, vegetation and the other creatures which exist in the world."³

The Bundelesh⁴ thus refers to the terror struck among the people by the appearance of a comet:—"The distress of the earth becomes such like as that of a sheep when a wolf falls upon it." The Avesta,⁵ Pahlavi, Pazend⁶ and Persian⁷ books when they want to speak of a great alarm or terror, use this simile, *viz.*, that of the sheep being frightened by the coming of a wolf in their midst.

1 Elliot's History of India, Vol. VI, p. 407.

2 S. B. E. Vol. V (1880) p. 22.

3 Bundelesh, Chap. XXVIII, 45. S. B. E. Vol. V. p. 114.

4 *Ibid* Chap. XXX, 18. S. B. E., Vol. V, p. 125.

5 Vendidad XIX, 33.

6 Afrin-i Ardafarosh.

7 Le Livre des rois par M. Mohl, vol. I, p. 365. "Il apercut ses hommes de guerre qui avaint peur de l'elephant comme une brebis quand elle voit la face du loup."