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MAHAMARI, OR THE PLAGUE,  
IN BRITISH GARHWAL AND KUMAUN. ✓

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# MAHAMARI, OR THE PLAGUE, IN BRITISH GARHWAL AND KUMAUN.

1. The plague, *Pestis septica*, Syrian, Levantine, or Egyptian plague, the bubonic plague of Western China, and Gola or *Phutkiya rog* and *Mahamari* of British Garhwal and Kumaun are doubtless one and the same disease, which has existed in all probability in the hill tracts of India and China from time immemorial.

2. The disease, so far as history records, was prevalent in Europe in the sixth century, B.C., and is said to have spread at this period over the greater part of the habitable globe; and since then it has been recorded in Syria, the Levant, Egypt, and elsewhere. Dale Ingram published an historical account of the disease as far back as 1755. Moscow was the scene of an outbreak in 1770, and in 1813 the disease prevailed at Malta, and in 1834 at Cairo.

In India the disease has ever had a home, and prevails off and on till the present day in British Garhwal and Kumaun. In 1813 the plague was present in Central India and Rajputana, Kutch and Kattywar, and was first noticed at Kumtakole, and spread throughout Wagar during January, February, and March 1816, and by the end of that year had extended to Scinde, where the mortality was great. The disease was still prevalent in Central India in 1819, and disappeared in 1821. Nothing more was heard of the disease in Central India till July 1836, when it broke out at Pali, a town of Marwar, whence it spread to Jodhpore. It prevailed at Deoghur in Meywar in March 1837, and thereafter extended to Jalia and Ramghat in the district of Ajmere. The disease all but disappeared towards the end of 1837, but in November of that year it again broke out in epidemic form at Pali, and continued till February the following year.

It is more than probable that the plague was introduced into Pali and Rajputana in 1837 from the Levant, as the "Chhipis," who printed the pieces of plain cloth brought from the coast from Bhownagar and Surat, were the first affected.

3. The Himalayan districts of the North-Western Provinces in which the disease occurs comprise:—

- (1) Garhwal, bounded on the north by Tibet, on the east by Kumaun, on the south by Bijnor, and on the west by Tehri and Dehra Dun; and
- (2) Kumaun, now divided into two revenue districts, Almora and Naini Tal, bounded on the north by Tibet, on the east by Nipal, on the west by Garhwal, and on the south by the Tarai.

These contiguous districts lie between north latitude  $28^{\circ} 14' 15''$  and  $31^{\circ} 5' 30''$ , and east longitude  $76^{\circ} 6' 30''$  and  $80^{\circ} 58' 15''$ , and embrace an area of 11,033 square miles.

4. The population numbers close on 1,000,000 souls with an average of 72 to 76 persons to each square mile, living at elevations from 1,500 to over 11,000 feet above sea-level. For practical purposes the entire population may be classed as Hindu, as very few Musalmans, &c., are natives of the hills. The greater proportion of the population live at from 3,000 to 6,000 feet above sea-level overlooked by the crowning peaks rising from 20,000 to over 25,000 feet of the great Himalayan range.

5. Outbreaks of the plague in these Himalayan hill tracts, the most mountainous in the world, are of two kinds—

- 1st, spontaneous outbreak;
- 2nd, outbreaks caused by importation of the disease.

Spontaneous outbreaks are frequently associated with, and sometimes preceded by, a great mortality among rats, mice, and other rodents, &c.

6. The plague or pestilence of the hill tracts is distinguished from all other fatal febrile malignant diseases by its extreme virulence, rapid course, fatality, and by the enlargement of the lymphatic (inguinal, axillary, cervical,

&c.) glands, the characteristic lesion of the disease when death does not ensue within the first three days from extreme virulence and direct shock of the great nerve centres. It has the shortest period of incubation probably of all known diseases, and it may prove fatal within 24 to 48 hours after exposure to infection, and there is clear evidence that the disease is communicable from the sick to the healthy.

7. The disease appears ever and anon in village or hamlet situated "on precipitous mountain-side, in gorges reached only by means of a cradle swung on a rope above a boiling flood of snow water low down in a hill valley, in secluded spots reached by dubious pathways winding up a wooded glen starting from the river far below, or upland slope close to the sources of a river formed by a waterfall, in secluded places, wilder it would be hard to find in all the hills reached by a footpath winding over a high mountain and near where the Margari stream arises in cuplike valley surrounded by high mountains on a spur hillock-shaped, on the slopes of opposing mountains, on hills of moderate height, in bends of a river hemmed in by the hills, on three sides on the brow of a hill which stands out from the mountain behind it, on the slope of a great mountain overlooking the valley in which the river runs, on green hillock backed by high mountains, and on a spur of rocks jutting into a narrow valley," overlooked by the highest Himalayan peaks capped with the eternal snow. Here, where the atmosphere and climate are the finest and purest in the world, and at heights where the germs and microbes of disease are kept within a narrow sphere, exists a disease which in its infectious nature and fatality surpasses all others in virulence, and ever threatens to break bounds and spread and be disseminated far and wide as in past times throughout Christendom. Cholera spares of the household, but the plague often reaps each one of the many members of the upland home. So dreaded is the disease that family ties in its presence are suddenly broken, and the father and mother flee from their children and abandon each other, seeking the lone mountainside in despair for a time of all human association.

8. The earliest record of the disease in the hill tracts is embodied in a report, dated 25th April 1836, by Mr. Gowan, the Commissioner of Kumaun, in which it is stated that *mahamari*, which was thought communicable by contact with articles in use in an infected tract, first appeared at Kedarnath in 1823. It originated, it was affirmed, in the person of the rawal or the high priest of the celebrated temple there, who, having in that year deviated from the rules prescribed in the Shastras for the performance of the religious ceremony called the "Hom," was smitten with this new form of disease and died together with the Brahmans who assisted at the offering. From Kedarnath the disease spread to the villages in religious assignment to the temple, and afterwards appeared in other parganas of Garhwal. Others said that the disease came into existence for the first time at the Harwar Fair.

9. In 1834-35 the appearance of the disease in the parganas of Nagpur and Badhan Garhwal was preceded by a great mortality among the rats in a village. The disease was characterised, it is stated, by fever terminating fatally in two, three or four days, and associated with an eruption of buboes or swellings.

10. During 1837 the disease was alarmingly prevalent in the pargana of Badhan along the higher parts of the Pindar river, and in 1846-47 it found its way to the sources of the Ramganga, and almost entirely swept away the population of Sarkot, situated at 7,000 feet on a high easterly spur of the great mountain Duder Ka Toli in patti Lobha, and also to a village near the source of the Kosi in patti Borarau, Kumaun proper. In 1847, a village 15 miles west of Almora, situated among the pine forest of Siyahi Devi range, was attacked, and in the latter end of 1848 a few villages along the fatal line of the Pindar river were threatened with a return of the disease. During the rainy season of 1849 it broke out with great virulence in patti Chaprakot, pargana Chadpur, and proved very fatal in the villages of Marora and Dadoli, and the Senior Assistant Commissioner of Garhwal, Mr. Strachey, now Sir John Strachey, in a report, dated 22nd December 1849, gave particulars of the outbreak. Mr. Strachey writes:—"For about 30 years past there has existed in Kumaun and Garhwal a disease known by the local name of *mahamari*, apparently identical with the plague of Syria and Egypt, the characteristic symptoms

being violent fever of the most contagious nature, always accompanied with swellings in the armpit, the disease ordinarily seeming to reach its crisis on the third day."

11. Dr. Renny on the 9th May 1850 commenced a local investigation into the disease at Dadoli village, patti Chaprakot, and saw two cases on the 10th and two more cases on the 13th. He described the disease as an infectious fever of a malignant kind and of a typhus character, accompanied by glandular tumours, and generally terminating in death in three or four days. The mortality from the disease in 1849-50 was 113 in nine villages.

*Mahamari* was again prevalent in 1851, and in a joint report on the disease, dated 1st December 1851, by Dr. Pearson and Sub-Assistant Surgeon Sri Nath Mukerji, it is described as a typhus fever of contagious and infectious type. In a subsequent report, however, dated 17th May 1852, on the continuance of the disease into April and May, these officers after extended observations recorded the opinion that the disease was plague, associated with characteristic glandular swellings, and distinctly contagious in its nature. It still existed in August of that year. There was an ascertained total of 633 deaths during the epidemic of 1834-35, and in 1851-52 567 deaths were recorded in 77 villages.

In 1852-53 Drs. Francis and Pearson were actively engaged in the investigation of the disease, and recorded the *post-mortem* appearances in four cases, of which the principal were congestion of the brain, a diseased condition of the blood, and effusion into the serous cavities.

12. *Mahamari* descended to the plains as late as 1853. In that year it appeared in an epidemic form in the towns of Thákurdwara and Afzalgarh, and in the district of Moradabad. Dr. Steven, Civil Surgeon of the district, reported on this outbreak in the plains. "It seems," he states, "that in December 1853 Ali Baksh, a resident of Mehidpur, a village in the Bijnor district between Thákurdwara and Afzalgarh, where the disease was prevalent at the time, went to the latter town to see a *nautch*, that he returned to his home in Mehidpur; and that three days afterwards his brother Muhammad became ill and died on the third day of his illness. Ali Baksh's cousin also took ill and died in three days, having had as described to me swellings of the glands in the groin. Ali Baksh's wife and sister living in the same house also died." Dr. Steven attributed the origin of the disease to contagion brought by Ali Baksh in a latent form from Mehidpur. Dr. Steven referred to the fact that *paharis*\* brought down goods for barter to Chilikia, a very important mart near Kashipur, and surmised that the disease was introduced by hill people, in intimate intercourse with the people of the district.

The disease was very prevalent also in Kashipur early in 1853, and lingered in the Moradabad district till 1854. Dr. Steven saw a few cases which were characterised by high fever and swelling of the glands of the right groin or of the armpit. It also prevailed in Rampur at this time; and it is stated that about 8,000 deaths occurred from the disease.

Dr. Steven's conclusions were—

- (1) that *mahamari* is identical with the uncomplicated or simple form of glandular plague as found in Egypt;
- (2) that it can be conveyed to any town by contagion, and be propagated by endemic causes as filth, bad ventilation, poverty, and uncleanness of the inhabitants.

13. In September 1859 *mahamari* again broke out in the northern paraganas of the hill tracts, and in 1860 it was noted that close upon 1,000 persons had died of the disease.

An outbreak of the disease occurred at Sarkot on 20th September 1870, and continued till the 9th of November.

14. Dr. Richardson in a report, dated 4th October 1875, on *mahamari* at Siti, patti Danpur-Bichla, after stating that the last of six cases occurred on 9th September, says that the first victims were a little girl aged 8 and her father, Kusalli, aged 30. They were attacked about 1,000 feet above the village of Siti and near the edge of the oak forest. Both were seized with

\* *Paharis*=hillmen.

fever, vomited once or twice, had large swellings in the groins, and both died on the fifth day after seizure. The bodies were thrown into a stream below. On the day the bodies were disposed of two other persons living in the same building were attacked after disposing of the bodies, and remained at Siti. They were taken or sent into the jungle and died there, and were buried where they died; but their graves must have been shallow, for their bones were afterwards found scattered about. Thus of the six deaths four were among persons occupying the same building. The two last were Gujuali, aged 45, and Dhanali, aged 45, husband and wife. The next victim was a man 28 years of age. He had severe fever for two days, when large swellings were observed in the armpits. He vomited twice during the illness like others. He died on the fifth day, and his house was burnt and the body with it. The last who died was a boy Mulaki, son of Dharam Singh. He was taken ill, and died about a mile from Siti in the jungle.

Dr. Pearson in a report, dated 22nd June 1876, states that he inspected villages in patti Bisaud, where 50 deaths from *mahamari* had been reported.

15. In November and December 1876 the disease was prevalent in certain villages in Kumaun, and prevailed in Balt and Bintola, within four miles of Almora and within five miles of Rânikhet. Dr. Planck inspected 40 villages affected by the disease, and recorded 277 deaths and confirmed the opinion that the disease was the pestis or plague of medical writers, and was readily communicable from the sick to the healthy. The villages included nine in pargana Khas Parja, 12 in Bora-ki-Rao, 2 in Attargoli, and 17 in pargana Daupur, as follows:—

Parganas.	Villages.	Parganas.	Villages.
Khas Parja	Balt. Bintola. Sirár. Nainoli. Gajula. Salla. Biraúra. Maichor. Matoli.	Attargoli	... { Bhándargáon. Dugorá.

*Return of deaths from Mahamari, 30th June to 16th July 1877.*

DISTRICT.	Pargana.	Patti.	Village.	NUMBER OF DEATHS REPORTED.			
				Men.	Women.	Children.	Total.
Kumaun	Paramondal...	Athagali ..	Bhandergaon ...	...	..	2	2
	Danpur ...	Danpur Talla	Gadera ...	1	1	...	2
			Total ...	1	1	2	4

The Commissioner of the Kumaun Division, writing under date the 19th July 1877, says the recent epidemic seems to have come to an end, and states that the area affected has been in Garhwal, the parganas of Nagpur,

Chandpur, Budhan, Chandkot, and Dewalgarh, and in Kumaun the parganas of Danpur, Johar, and Baramandal, the total deaths up to date being 535.

DISTRICT.	Men.	Women.	Children.	Total.	REMARKS.
Kumaun ... ..	105	69	64	238	Last report, 20th June, one death.
Garhwal ... ..	199	73	25	297	Ditto 9th July, five deaths.
Total ... ..	304	142	89	535	

*Return of deaths from Mahamari, 3rd April to 14th May 1878.*

Deaths.	Pargana.	Patti.	Village.	NUMBER OF DEATHS REPORTED.			
				Men.	Women.	Child- ren.	Total.
Kumaun ... {	Baramandal...	Khasparja ...	Bhulyara ...	3	3	...	6
	Do. ...	Do. ...	Bintola ...	1	2	1	4
			Total ...	4	5	1	10

16. Dr. Richardson reported that typhus fever identical with *mahamari* prevailed more or less throughout the year 1884 in the Kumaun Division, and in 1885 he visited certain villages, Sirka, Rung, &c., in patti Chaudans, pargana Darma, where the disease had been prevalent.

17. In 1886 the same officer visited villages in patti Giwar, pargana Pali, in which 13 deaths took place from the same cause, and was informed on 13th October that ten persons had died of *mahamari* in Seri, Danpur. He noted also that "a great number of deaths from *mahamari* took place in Garhwal during the year 1886." Dr. Thomson also reported on the outbreak of *mahamari*, identical with typhus fever, in April and May 1886, but the reports of these outbreaks are very meagre.

On the 28th March 1887 the disease was reported at Khatiari adjoining the military station of Almora. On the 5th April, at Gonja Jali in Bhabar Chhakata, on 27th May, 14 deaths were reported from Bijapur village, patti Dora Mulla, pargana Pali, and on 14th June three deaths in Nakutta village, patti Tikhun Mulla. The Collector of Kumaun on the 11th October 1887 gave a summary of deaths from *mahamari* in Danpur, as follows:—

Date.	Name of village.	Number of deaths.
24th August to 27th September.	Dasauli in Pungraun ...	31
30th September ...	Lohathal " ...	3
4th to 29th September ...	Surkali in Nakuri ...	7
25th to 30th " ...	Ghali ...	3
	Suugroli ...	1
	Total ...	45

Dr. Thomson, who reported on this outbreak on 13th June 1888, states that the first case at Dasauli occurred in the person of one Gungia Patak, who it is stated recovered. The first case noted in the neighbouring village of Lohathal, on the 18th September, was in the person of a resident of Dasauli. A second case took place in the same house in which two more persons died in October.

An outbreak occurred at Gangoli, Kumaun, on the 4th October.

Under date the 24th October the following deaths from *mahamari* were reported :—

Date.	Name of village.	Number of deaths.
8th October ... ..	Lohathal in Pungraun ..	1
9th " ... ..	Dasauli " ...	10
15th " ... ..	Surkali in Nakuri ...	1
15th " ... ..	Dhari " ...	1
	Total ...	13

On the 2nd November five more deaths had occurred from the disease in Dasauli, and on the same date four deaths in pargana Chaugarkha, Salan Talla. On the 19th November 14 deaths from *mahamari* were reported between 24th and 31st October in Dasauli village, patti Pungraun, pargana Danpur; and on the 5th December *mahamari* had again made its appearance, one death being noted in Surkali, patti Nakuri, pargana Danpur.

On 29th March 1888 two fatal cases were noted in Kaurea near Dasauli, and on 5th April a woman died of the disease in Khitauli, and on 8th idem the husband of the woman died. On the latter date a boy died in Lohathal. The house in which former cases had occurred had stood empty for some months, the owners living a short way off in *chappars*. But this boy knew of the existence of "*gur*" in, and was observed taking some from, the house. On May 9th two deaths occurred at Singor.

A death from *mahamari* in village Lagor, patti Pungraun, was reported on the 15th May 1888, and the disease was said to be present in Uskot and Rithagarh, pargana Chaugarkha, at same time.

Dr. Thomson in his report of the outbreak states that the disease was *mahamari*, *gola rog*, or *phutkia*, hill plague, or a severe type of typhus fever highly contagious and bred and fostered by filth. On the 13th September 1888 a statement was furnished by the Senior Assistant Commissioner, Garhwal, showing that five deaths from *mahamari* had occurred in Nagpur and 16 in Dewalgarh mortuary circles, 5 in Badhan, and 2 in Nagpur.

18. The history of the disease in its incidence among the people of the hill tracts from 1887 onwards is imperfect, owing, it is presumed, to the confusion arising from adopting the view that *mahamari* and *sanjar*, or typhus fever, were identical disease.

19. No cases of *mahamari* were reported in Garhwal or Kumaun in 1889 or 1890. In 1891 six deaths from the disease occurred in patti Karakot, pargana Badhan, between 27th June and 21st July (two deaths in June and four in July). The record is blank in 1892.

20. In 1893 two limited but associated outbreaks of *mahamari* occurred in July and September in mauzas Surkai and Suni, patti Nakori, pargana Danpur, a few miles off the Bageswar-Berenag road, and about two marches from Bageswar.

The first outbreak occurred on the 8th July and the second on the 13th September, and these outbreaks were associated, and each case was connected with, some other preceding case or cases.

The extremely infectious and fatal nature of the disease is evidenced by the fact that it was communicated direct from the sick to the healthy, and that all those attacked died.

The affected families in both outbreaks occupied houses situated in a large gently-sloping horseshoe-shaped valley, at an elevation of about 6,000 feet above sea level.

The houses in the locality are dotted round the upper margin of an extensively cultivated and terraced area, and form no collection that can be called a village.

The families affected were comparatively well-to-do people, and poverty or destitution had nothing to do with the outbreaks. The site and natural surroundings of the dwellings are exceptionally healthy, and the families

undoubtedly lived in a naturally and exceptionally healthy climate, but under conditions which favoured the onset and dissemination of zymotic disease in its most intense form.

These two families occupied the end rooms of an isolated block of three houses, the centre house having remained empty for the previous six months, and the families had been resident in Surkali for years.

The first case occurred in the person of a girl whose father, it is stated, died seven years before of the same disease, and of the two whole households of Kuna Sah and Ratna Lal, which were affected, all the members, numbering 11 souls, succumbed to the disease.

The scene of the second was less than a mile from that of the first outbreak, and although the occurrences were fewer, they were no less fatal.

The first case in the second outbreak occurred in the person of a man by name Tejgir, who helped to fire the infected shed where lay the dead of the disease in the first outbreak. After a certain interval he succumbed, having previously affected those about him; and a visitor from a distant village who, on his return to his home, took ill and died of the disease.

The father of the first affected is said to have died of *mahamari* seven years before; but there is no evidence to show any connection between the events, or that the recrudescence of the disease was due to any circumstance connected with the prevalence in the same locality in 1887.

The following summary shows the dates of the occurrences and connection between the outbreaks, and indicates the malignant character of the disease :—

*Mahamari in Patti Nakori, Pargana Danpur, in 1893.*

Place of occurrence.	—	Girl.	Woman.	One person.	Two persons.	One person.	Two persons.	One person.	One person.	One person.	
Mauza Surkali ...	Persons, Banias. Date of attack, 8th July, 10th. Date of death, 10th July,			11th,	14th,	15th,	16th,	17th, July.	1st,	2nd,	3rd August.
									On the 17th August Tejgir helped to fire the shed in which the dead bodies lay.		
Mauza Suni ...	Persons, Jogis. Date of attack, 13th September. Date of death, 18th	Tejgir.				Monagir. 17th, 21st,		Gopalgir. 22nd, 26th,		Female. 22nd, 25th.	
									Punagir visited Tejgir when the latter was ill of the fever.		
Mauza Maghera ...	Person, Jogi. Date of attack, Date of death,		Punagir.								

The persons who succumbed in the mauza Surkali comprised the members of two whole households; those in mauza Suni were of one family, and Punagir of mauza Maghera was a caste-brother of Tejgir. Punagir visited Tejgir on the 13th September while the latter was ill of the fever, and returning to his home five miles away on the further side of the Pangra river, was seriously ill the next, and died the following day.

The inhabitants of Barkuri separated by a spur of a hill from Surkali vacated their village on the 22nd July on account of a great mortality among rats and mice, and an outbreak of *mahamari* was thus in all probability averted.



Bubo was noticed both in the axilla and inguinal regions in some other of the latter cases, but in none of those who died quickly at the first outset of the disease. And it was only after the buboes were seen, that the people knew they were suffering from an outbreak of *gola*, the name given by the hill people to the disease. No appearance of bubo occurring in the first rapidly fatal cases, the people thought the disease was *sanjar*, a form of continued fever common amongst the hill people and frequently fatal, but believed to be less contagious, and therefore less dreaded than *gola*.

From the time the people vacated the site to live in temporary huts or in caves on the hillsides, only one death occurred, as will be hereafter described.

In Balt the first case occurred in the person of a woman named Bani, who had gone to the padhan's house at Bintola to assist in nursing the sick children there. She resided and died in one house of a terrace of seven in the upper part of Balt; next her daughter died; then four persons died in the adjoining house; then her husband died, and the disease spread through the terrace; so that deaths occurred in every house excepting one, which was untenanted. In all, 13 persons died in the terrace during December, and then, as at Bintola, the people of the villages vacated their houses as soon as "gola" or bubo was noticed as a symptom of the disease in those who lived beyond the fifth day. Indeed, deaths from *gola* being reported, the civil authorities directed the people to vacate their houses, and they located themselves in huts of grass and branches on the hillside. All remained well until a great fall of snow occurring on the 14th of January, the people returned to their homes; and during the succeeding five days four more deaths occurred in the houses of the terrace previously affected. The people, seeing this return of sickness, fled at once to the hillside, leaving the sick, who died unattended in the houses.

The local conditions at Balt and Bintola were as follows:—Both villages were uninhabited, the former inhabitants scattered in families miserably lodged in huts or caves far off; the village cattle roaming and feeding amidst the young wheat of the cultivated terraces around and below the villages. The torn remains of 13 cows, calves, or bullocks, and five goats, scattered in different places, witnessing to the truth of the local statement that, from dread of the disease, no one dare venture on to the site to house the cattle as night approached, and that consequently leopards and hyenas were devouring the flocks.

The houses were double-storied, one room below and one above, close, unventilated tenements. The lower room was used as a cow-house, the upper room for family occupation. In the lower room, about 5 feet high, it had been customary to lodge from four to eight head of cattle or goats at night, and, indeed, in some instances as many as the room had standing place for; the only opening being the small doorway of entrance tight closed and barred at night. These rooms were seen to be littered for about a foot in depth with decaying straw and much manure, moistened by the fluid excretion of cattle, and the entrance way on each side and the stone platform facing the lower storey were piled with heaps of manure, which had been drawn out of the lower room as necessity required, and there left for eventual removal to the land in the ploughing season. The upper room was noticed to be roughly divided by wooden slabs into a front and back portion; the former used as the family sleeping place, the latter as a granary. The doorway, and in some instances a round hole in the front, and a small round hole for the exit of smoke through the roof of the house, all commonly closed at night, being the only opening. The floor was made of thin wood, with pretty numerous cracks, so that the warmth generated by the cattle below could reach to the sleeping people above, afterwards locally described as a beneficial arrangement.

Upon the stone platform facing the terrace abovementioned lay the broken remains of the four persons who had last died, their limbs and skulls torn and scattered by jackals.

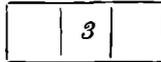
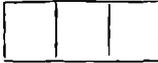
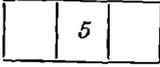
As regards the site generally, and the precincts of the village, nothing naturally insanitary could be seen. With the exception of a grove of pine trees at one place, the sharply sloping surface was clear of excessive vegetation everywhere. A mountain stream of bright water flowing between the village sites furnished an ample supply of good water for domestic purposes. Above the village sites all was clear, open rocky ground, around and below the sites almost all the surface had, by the patient industry of many years, been

fashioned into narrow terraced fields, spreading down in green steps of young wheat and barley to the margin of the rocky stream flowing in the very bottom of the valley.

Alam is another village of about 12 houses, high placed in the precipitous mountainside above the Gori river. To reach it from the Gori valleyside, the river, a boiling flood of snow water, has to be crossed by means of a cradle sliding on a rope, the apparatus being temporarily provided for the use of the visitor.

The houses are placed on the mountainside in the following order:—

*Alam.*



Alam was inspected on the 12th of May 1877. In all, eight deaths in two families occurred here from gola disease, the following being the history of the outbreak.

The disease commenced in the padhan's family with the illness of the padhan's brother, who came home ill with fever from a shooting excursion on the 4th of March, and died on the 7th, swelling appearing in his groin before he died. In this family the wife of another brother and her child died during the period between the 7th and 23rd of March, and in both cases bubo appeared as a symptom.

The man who first died lay sick, was visited several times by a man who had recently come from Askot to settle with his family in three attached houses, highest placed of any in the village. This Askot man was taken ill on the 11th and died on the 16th of March, a swelling appearing in his armpit before he died. He died in his house attended by his wife, who buried his body just outside the house door. Three days after he died his wife was taken ill, and died after four days' illness; and her body was left in the house unburied. The five remaining members of the family, four boys and one girl, fled to a neighbouring hut, where they lived together for a few days, the eldest, a boy of 14, acting as head of the family and providing food for the rest. This boy, feeling himself ill, returned into the house alone and died, his body also remaining in the house. Four children remained, the eldest, a girl of nine named Danuli, and her three brothers aged respectively 7, 5, and 1½ years. Danuli worked for and fed them all for a few days, and during this period the boy of 7, wishing to take honey from a hive in the house, entered it with burning straw or wood to drive the bees away. Either from carelessness or as the result of fright at seeing the dead bodies, he set the house on fire; and all three tenements were burnt down. A few days after the house was burnt down the boy of seven was taken ill and died in the hut; and his death was followed by that of the boy of 1½ after an interval of some days. So that Danuli and one brother only were left.

Before reaching the village on the 12th of May, I had been informed that possibly children might be found there abandoned. The village was found empty and desolate, and Danuli and her brother were found near the place of temporary abode outside the village, the former, a bright-eyed little girl dressed in an old petticoat, the latter a little urchin wrapped in a piece of old blanket. These children had lost their parents on the 20th of March, and from

that date had been thrown on their own resources, except for a few days while the elder brother lived, for no person of the village would approach them.

The girl Danuli recounted, in disjointed sentences, her experiences of the past eight weeks, explained how her father, mother, and big brother had died; how all the people ran away out of sight; how the house had been burnt; how her brother of seven had died and his body been carried away by jackals in the night time; how she had buried her little brother of  $1\frac{1}{2}$ , taking the body in a basket and digging a trench for it with a pick; and lastly, how she had been left only with the remaining brother husking and cooking rice for both every day, leading her brother down to a stream to drink, and sleeping with her arms about him every night. Even now that so long a period had elapsed since the last person had died, no native person present would approach these children, who sat hand-in-hand, apart, as the girl told her pathetic tale of suffering and endurance.

The two children were taken down the mountainside to a stream in which they were washed, their clothing was burnt, and they were reclothed and provided with blankets. Afterwards they were passed in the cradle across the Gori, and given in charge of their grandfather, who was much moved at sight of the children and promised to care for them in his village on the mountain opposite Alam.

Such is the history of many a household during the occurrence of the plague, which exists to this day in British Garhwal and Kumaun.

23. The ever-recurring recrudescence of the plague in this portion of the Himalayas may be ascribed to the engemination of a specific poison, and its spread by fomites and other means through neglect to destroy article, &c., likely to convey and retain infection for long periods, and to the imperfect burial of the dead in epidemic and at other times. The accidental uncovering of a grave, disturbance of soil, &c., or the unearthing of a long-neglected or hidden household article may undoubtedly let free the specific poison just as the special communicable poison of scarlatina, small-pox, &c., may be wrapped up in a dirty rag or other article for years.

24. The cause of the disease, however, is still obscure. It has been ascribed by Dr. Watson to the eating of diseased grain, especially to the use of "mandua" (*Eleusine coracana*), and the fact that rats and mice have access to grain stores and die of the disease often prior to the outbreak among the people seems to have confirmed him in his behalf, strengthened by the supposed fact that a quantity of diseased mandua sent from an infected village to be ground at a water-mill caused the death of all rats about the mill. Others have ascribed the disease to the use of chua (*Amaranthus frumentaceus*), and it is where this grain is chiefly used or forms the staple food of the people that the disease first breaks out. However, Doctors Francis and Pearson have pointed out that the villagers on abandoning an infected village take their supplies of grain with them, and that the pestilence is usually stayed, although the food supply is the same as when the people occupied the infected locality.

Doctors Francis and Pearson fully investigated the point and satisfied themselves that Doctor Watson's supposition could not be supported by properly authenticated facts.

25. Light has lately been thrown on the etiology of the disease by investigations into the occurrence of the recent epidemic at Hong-Kong. The confirmation of the fact that a special organism exists in the blood and tissues of those affected by the disease seems to indicate that a special bacillus is the cause of plague. The demonstration of its abundance in the inguinal glands of the affected and of the rapidly fatal effect of the inoculation of the micro-organism (an encapsuled diplococcus, difficult to strain by the usual re-agents, but easy to cultivate on gelose) on rats, mice, and guinea-pigs would seem to point to a definite conclusion. It only remains for us in the North-Western Provinces on the next appearance of the disease in the Himalayan hill tracts to confirm such conclusions by demonstrating the presence or non-presence of the newly discovered bacillus in connection with the disease as it occurs among the people of British Garhwal and Kumaun.

26. Mahamari has been fostered by the uncleanly and filthy habits of the people of the hill tracts, who house cattle sheep, goats, and other animals on the ground floors of their unventilated houses, and allow accumulations of

sewage, refuse, and litter in the immediate vicinity. They also defile and pollute the neighbourhood of the village in defiance of all sanitary law, and in their helplessness permit refuse and noxious weeds to fill the air with rank odours, adding to the foul emanations that penetrate every nook and corner of the overcrowded impure dwelling which forms a nursery of zymotic disease, and is the birthplace of the pestilence.

27. The remedial and preventative measures, as embodied in the rules for the prevention of mahamari, comprise :—

- (1) The housing of all cattle, goats, sheep, &c., in sheds at a distance of not less than 50 feet from the village, the sheds being located below the village if possible.
- (2) Attention to the ventilation of houses and the prevention of overcrowding by the distribution of families in different rooms.
- (3) The prevention of nuisances in or near the village.
- (4) The clearances of accumulated filth, manure heaps, and rank vegetation from within and around the dwelling-houses.
- (5) The preservation of the water-supply from pollution and contamination.
- (6) The evacuation of the infected houses and of the village on the death of rats or mice in observable numbers or on the occurrence of the disease among the people.
- (7) The destruction by burning of bedding, clothing of the infected, and the proper cremation of the dead of the disease ; and
- (8) The destruction by fire of the house, together with any article likely to convey or retain infections in which a death from mahamari has occurred.

28. Continued immunity from mahamari in an epidemic form makes the rising generation, as Sir Henry Ramsay wrote in 1882, under-estimate the danger " arising from the continued presence of this preventible disease."

It is still necessary to emphasise the need for increased watchfulness and for maintaining the strictest sanitary precautions to prevent the disease from assuming undue proportions in the hill tracts. Otherwise its incidence might even yet prove disastrously fatal among the overcrowded communities of our hill sanitaris, within a few miles only of the locality of the ever-recurring pestilence.

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