

## A Glimpse at Viral Diseases in the Ancient Period<sup>1</sup>

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I feel honored at the invitation to deliver Purnima Raychaudhuri Memorial Lecture for two reasons, one that I personally knew that most charming lady, Mrs Purnima and also her husband, the late Dr S P Raychaudhuri, one of the most dynamic plant virologists of India, and two, even though I have not been an active virus researcher for more than a decade, I am considered qualified to deliver a special lecture to the audience of eminent virologists.

Viruses have existed in nature since the millennia, but the evidence of their existence is comparatively recent. Most of our textbooks inform us that the word “virus” originated from the Greek word *ios*, and was first used in English in 1599. However, we are never told that the Greek word *ios* actually originated from the Sanskrit word *visha*, meaning poison (see Webster’s dictionary).

We know very well that viruses are obligate pathogens and require living hosts for their own survival. Youngsters today will have to learn that the so-called “computer viruses” have nothing in common with the viruses that virologists study.

In this lecture, I have attempted to have a “glimpse” at some selected viruses mainly through religious and historical records.

### Plant viruses

In recent years, steps were initiated by me and my colleagues to rediscover the ancient and medieval knowledge base of South Asia by searching old manuscripts, texts, etc. and translating them into English. We have noted some possible cases of the existence of plant viruses in documents such as Vrikshayurveda (The Science of Plant Life) written by a physician, Surapala (c. 1000 AD) and Someshvardeva’s (Chalukyan king, 12<sup>th</sup> century AD) Abhilashtitarthachintamani or Manasollasa (1131 AD) (Shamasastri, 1926). In addition, the American Phytopathological Society’s Phyto-pathological Classic No. 7 (Johnson, 1942) describes the early history of plant virus studies.

Vrikshayurveda (the science of plant life) developed as a branch of Ayurveda, the millennia-old Indian science of human health management. Principles of Ayurveda were applied to trees and perennials, and treatments included prescriptions given to humans as also those required exclusively by trees/plants (e.g., manures).

Two types of yellowing have been described by Surapala (Sadhale, 1996). One, yellowing due to imbalance of the humor *pitta* (bile) and the other as *pandurog* (pronounced chlorosis). In addition, “non-productive” trees were also mentioned. These symptoms could be due to viral infections, but not necessarily so.

Treatments to cure leaf yellowing included (i) watering with decoction of *panchamula*, roots of five tree species, which are *Clerodendrum phlomidis (arni)*, *Aegle marmelos (bel)*, *Stereospermum suaveolens (padhal)*, *Gmelina arborea (gambhari)*, and *Oroxylum indicum (sonapatha)*; and (ii) watering trees with decoction of milk, honey, licorice root, and mahua (*Madhuca indica*) bark. Incidentally, a species of *Clerodendrum* has been reported to introduce systemically acquired resistance to viruses in plants (Verma *et al.*, 1996).

Surapala (Sadhale, 1996) stated that the *pandurog* could be brought under control in weeks by sprinkling water mixed with the powder of barley and wheat added to honey and milk. Likewise, non-productive trees bear fruits and flowers to “one’s complete satisfaction” when these are fed with milk and *kunapa* (a liquid manure prepared by boiling animal flesh, supplemented by other materials, incubated for 2 weeks and then applied as manure).

Manasollasa (Sadhale and Nene, 2004) mentions an incurable disease of many trees and calls it  *jyoti*, which connotes bright yellow appearance, and thus could be a yellows type disease.

Here a word about milk should be appropriate. A current widespread practice in several countries is to dip hands in milk to prevent mechanical transmission during the handling of seedlings. It is also appropriate to mention that the chili leaf curl can be controlled through sprays of milk (Arun Kumar *et al.*, 2002).

Indian literature, so far discovered, does not specify a disease that could be comparable to tulip breaking known during medieval times, which centuries later was attributed to a virus. Thus the Indian literature discovered so far can only provide us hints about possible existence of viral disorders.

Breakthroughs in virology occurred towards the end of 19<sup>th</sup> century (Johnson, 1942). A disease of tobacco was identified as a serious one in Gelderland and Utrecht provinces of Holland in 1886. Adolf Meyer (b. 1843), a German scientist, was appointed at Wageningen, Holland to investigate the cause of the tobacco disease. Meyer named the disease as mosaic, ignoring many other names that were used. Thus the world literature was soon filled up with the phrase “tobacco mosaic”. Meyer successfully attempted mechanical transmission using glass capillary tubes. Later, Ivanowski and Beijerinck established filterability of “virus” and infectious nature of the filtrate, respectively (Johnson, 1942). We all know rest of the history.

## **Animal viruses**

Animals were domesticated and utilized by Indians since the millennia. Some literature on animal management is available.

- Gavayurveda (Parashara, c. 400 BC) – Cattle
- Samhita by Shalihotra (c. 1800 BC); Bhoja’s manuscript (1100 AD) – Horses
- Hastayurveda (Palakapya, 600–500 BC) – Elephants
- Lokopakara (Chavundaraya, 1025 AD) – Cattle, horses, elephants, and others
- Tuzuk-i-Jahangiri by Jahangir (1605–1622 AD) – Elephants and others (Nene, 1998a; 1988b)
- Dictionary of Economic Products of India by G Watt (1889–1893 AD) – Different animals

## Rinderpest

Rinderpest has been a serious disease of cattle. It has names such as *kalawah* and *sahmat* in Punjab, *pitchinow* in western India, and *peya* in Tamil Nadu. Rinderpest has not been specifically mentioned in ancient Indian literature, possibly because diarrhea, due to different causes, was treated with similar medicines to alleviate symptoms.

Rinderpest is commonly reported from the Indian subcontinent, Middle East, and Africa. As we know, the rinderpest virus is related to measles in humans and viral distemper in dogs.

Watt (1891) stated, “The amount of injury and loss resulting from the unchecked ravages of this disease in India is something enormous. It appears to be present throughout the year at all seasons and carries thousands of cattle annually.” Watt (1891) recorded that in 1880, about one million cattle were affected in India.

## Foot-and-mouth disease

The disease has been known to exist for many centuries. It is claimed that the first report was from Italy in 1514 (<http://ag.missouristate.edu/footm1.htm>). However, Lokopakara (1025 AD) compiled by Chavundaraya (Ayangarya, 2006) described “boils of gum and hoof” as a distinct disease in cattle, a clear reference to the foot-and-mouth disease, almost 500 years before the report from Italy. Losses due to this disease are heavy, 5 to 50 percent depending upon which of the seven strains of this virus has affected the animals.

Watt (1891) stated that the disease, *khurpakka* or *khur* “is contagious and widespread, but as it is very mild, few cattle succumb to it. People pay little attention to the attacks.”

Indian texts prescribe many treatments, mainly to alleviate the symptoms. Lokopakara (Ayangarya, 2006) mentions the following two prescriptions:

1. Crush turmeric, roots of *Trichodesmata indicum* (*surasa*), datura, *Calotropis gigantea* (*arka*), and *Alpinia galangal* (*rasna*) and cook them in butter from cow milk, and apply it in the mouth.
2. Apply paste of ground *Pandanus odoratissimus* (*keora*) leaves and rock salt made in buttermilk on hooves and foment the hooves.

Current traditional practices followed in villages include oral application of a paste made from *Valeriana jatamansi* (*mushkabala*) in camphor or pine oil. Also affected animals are made to walk on hot sand (fomentation); neem extracts are poured on hooves.

## Rabies in elephants

The Mughal Emperor, Jahangir in 1613 AD in his memoirs, Tuzuk-i-Jahangiri, made a fairly detailed account of the occurrence of rabies in elephants. The description is reproduced below:

“I knew that every animal or living thing bitten by a mad dog died, but this had not been ascertained in the case of an elephant. In my time it so happened that one night a mad dog came into the place where was tied one of my private elephants, Gajpati by name, and bit the foot of a female elephant that was with mine. She at once cried out. The elephant-keepers at once ran in, and the dog fled away into a thorn-brake that is there. After a little while it came in again and bit my private elephant’s forefoot as well. The elephant killed it. When a month and five days had

passed after this event, one day when it was cloudy the growling of the thunder came to the ear of the female elephant, that was in the act of eating, and it all of a sudden raised a cry and its limbs began to tremble. It threw itself on the ground, but rose again. For seven days water ran out of its mouth, then suddenly it uttered a cry and died. A month after the death of the female elephant, they took the large elephant to the edge of the river in the plain. It was cloudy and thundery (sic!) in the same way. The said elephant in the height of excitement all at once began to tremble and sat down on the ground. With a thousand difficulties the drivers took it to its own place. After the same interval and in the same way that had happened to the female elephant this elephant also died. Great amazement was caused by this affair, and in truth it is matter to be wondered at that an animal of such size and bulk should be so much affected by a little wound inflicted on it by such a weak creature.” (Nene, 1998b)

Descriptions of rabies in elephants are rare. For example, Someshvardeva (1131 AD) makes no mention of rabies in elephants (Sadhale and Nene, 2004). The reason for sporadic cases of rabies in elephants could be that dogs probably do not dare to bite elephants in the wild, but find it possible to do so when the elephants are captive. It is interesting to note that the first documented case of rabies in elephants in Sri Lanka was as recent as 1998 (Wimalaratne and Kodikara, 1999).

## Human viruses

We find descriptions of human viruses in different encyclopedias. We also find references to human viruses in ancient Indian literature such as the Rigveda (c. 8000 BC), Charaka Samhita (c. 700 BC) and several other Ayurvedic texts until 1600 AD, Puranas (c. 200 BC to 750 AD), travel accounts of visitors to India, and some British records.

### Smallpox

The word smallpox appeared in English lexicon only in 1518 (Webster’s dictionary), though its occurrence was known since the millennia.

I have been able to discover a reference to smallpox in Rigveda (c. 8000 BC) (Sharma, 1991). In Book 7, Chapter 50, the verse 4 contains a prayer to waters of rivers seeking to keep humans free from a disease called *shipada*. Another word Simida appears in the same verse, which according to Griffith (1973) is apparently a female demon, or a disease, attributed to her malevolence. Sanskrit dictionary by Apte (1965) indicates that *shipa* could mean skin. It can therefore be conjectured that *shipada* is a reference to smallpox (a skin disease) that is believed to occur due to the malevolence of female demon Simida. Smallpox attributed even today by most folks in India to the displeasure of the “goddess” Shitaladevi substantiates the conjecture.

The evidence of smallpox on the Egyptian mummy of Ramses V (c. 1156 BC) is often quoted by various encyclopedias as an ancient instance of smallpox. Some sources quote occurrence in China as far back as 1122 BC. Smallpox was endemic in Europe by 17<sup>th</sup> century.

Temples of Shitaladevi exist all over India. Other regional names of the *devi* are Pochamma and Mariamma. Full description of the *devi* exists in Shabdakalpadruma (c. 1820 AD). The *devi* is shown seated naked on a donkey (Fig. 1). In one hand, she carries a broom and with the other she pours water over an indigenous winnower (*supa*) covering her head. This description is more appropriate for a female demon than for a goddess. Skanda-purana (c. 100 AD) describes the mode of worship. The festival, Shitalashtami, is celebrated in Hindu month, eighth day of the dark fortnight of *Chaitra* (March–April) (Joshi, 1976).



**Figure 1. Shitaladevi as described in Shabdakalpadruma (c. 1820 AD).**

Jean-Baptiste Tavernier (mid-17<sup>th</sup> century) mentioned “offering silver eye to goddess for sparing eyes”. This has reference to the fact that blindness was often a consequence of smallpox and was dreaded most (Ball and Crooke, 1995).

Sanskrit names for various skin diseases have existed for millennia. Smallpox is known as *sheetala*, *visphota*, *devi*, or *mata*. The chicken pox has a specific name *masurika*, i.e., pustules resembling lentil grain, and measles *romantika* (as small as skin pores).

**Treatments for smallpox in Ayurvedic texts.** For “instant” alleviation of burning sensation, pastes of barks of *Ficus* and other species are applied. Affected areas are cleaned with decoctions of several herbals. The chicken pox discharges are dusted with powdered cow dung ash (Chunekar and Pandey, 1998).

**Indians knew how to inoculate people against smallpox.** Dharampal (1971), a well known Gandhian, published a book titled “Indian Science and Technology in the Eighteenth Century” in which he reproduced some contemporary European accounts describing the status of science in India in different branches. Two accounts, one written by Rev. Coult and sent to Dr Oliver Coult, on diseases in Bengal, dated 10 February 1731 and the other by Dr J Z Zolwell, FRS sent to the President and Members of the College of Physicians in London in 1767 AD on inoculating for the smallpox in the East Indies. Both these accounts provide evidence that the Indians knew how to immunize people against smallpox. I am reproducing below a few paragraphs from the two accounts.

Rev. Coult (1731) states, “Here follows one account of the operation of inoculation of the smallpox as performed here in Bengal taken from the concurring accounts of several Bhamans (Brahmins – eds.) and physicians of this part of India.”

“The operation of inoculation called by the natives *tikah* has been known in the kingdom of Bengal as near as I can learn, about 150 years (that is approx. 1581 AD – eds.) and according to the Bhamanian records was first performed by one Dununtary (Dhanwantary – eds.), a physician of Champanager, a small town by the side of the Ganges about half way to Cossimbazar whose memory is now holden in great esteem as being thought the author of this operation, which secret, they say, he had immediately of God in a dream.”

“Their method of performing this operation is by taking a little of the pus (when the smallpox are come to maturity and are of a good kind) and dipping these in the point of a pretty large sharp needle. Therewith make several punctures in the hollow under the deltoid muscle or sometimes in the forehead, after which they cover the part with a little paste made of boiled rice.”

“When they want the operation of the inoculated matter to be quick they give the patient a small bolus made of a little of the pus, and boiled rice immediately after the operation which is repeated the two following days at noon.”

“The place where the puncture were made commonly festures (features?) and comes to a small suppuration, and if not the operation has no effect and the person is still liable to have the smallpox but on the contrary if the punctures do suppurate and no fever or eruption ensues, then they are no longer subject to the infection.”

“The punctures blacken and dry up with the other pustules.”

“The fever ensues later or sooner, according to the age and strength of the person inoculated, but commonly the third or fourth days. They keep the patient under the coolest regimen they can think off before the fever comes on and frequently use cold bathing.”

“If the eruption is suppressed they also use frequent cold bathing. At the same time they give warm medicine inwardly, but if they prove of the confluent kind, they use no cold bathing, but [keep] the patient very cool and give cooling medicine.”

“I cannot say any thing of the success of this operation or of their method of cure in this disease, but I intend to inform myself perfectly when the time of this distemper returns which is in April and May.”

Apparently Rev. Coult was skeptical about the procedure. Since Rev. Coult had depended upon descriptions of procedures narrated by Brahmins, it is likely that his information had gaps, and that made him skeptical.

J Z Holwell (1767) wrote the following:

“On perusing lately some tracts upon the subject of Inoculation, I determined to put together, a few notes relative to the manner of Inoculation, practiced, time out of mind by *the Bramins of Indostan*; to this I was chiefly instigated, by considering the great benefit that may arise to mankind from a knowledge of this foreign method, which so remarkably tends to support the practice now generally followed with such marvelous success.”

“Every seventh year, with scarcely any exception, the small pox rages epidemically in these provinces, during the months of March, April and May; and sometimes until the annual returning rains, about the middle of June, put a stop to its fury. On these periodical returns (to four of which I have been a witness) the disease proves universally of the most malignant confluent kind from which few either of the natives or European escaped, that took the distemper in the natural way, commonly dying on the first, second, or third day of the eruption; and yet, Inoculation in the East, has *natural fears* and *superstitious prejudices* to encounter, as well as in the West. The usual

resource of the Europeans is to fly from the settlements, and retire into the country before the return of the small pox season.”

“The inhabitants of Bengall, knowing the usual time when the inoculating Bramins annually return, observe strictly the regimen enjoined, whether they determine to be inoculated or not; this preparation consists only in abstaining for a month from fish, milk, and ghee (a kind of butter made generally of buffalo’s milk). The prohibition of fish respects only the native Portuguese and Mahomedans, who abound in every province of the empire.”

“When the Bramins begin to inoculate, they pass from house to house and operate at the door, refusing to inoculate any who have not, on a strict scrutiny, duly observed the preparatory course enjoined them. It is no uncommon thing for them to ask the parents how many pocks they chuse (sic!) their children should have: Vanity, we should think, urged a question on a matter seemingly so uncertain the issue; but true it is, that they hardly ever exceed, or are deficient, in the number required.”

“They inoculate indifferently on any part, but if left to their choice, they prefer the outside of the arm, midway between the wrist and the elbow, for the males; and the same between the elbow and the shoulder for the females. Previous to the operation the Operator takes a piece of cloth in his hand, (which becomes his perquisite if the family is opulent,) and with it gives dry friction upon the part intended for inoculation, for the space of eight or ten minutes, then with a small instrument he wounds, by many slight touches, about the compass of a silver groat [The instrument they make use of, is of iron, about four inches and a half long, and of the size of a large crow quill, the middle is twisted, and the one end is steeled and flatted about an inch from the extremity, and the eighth of an inch broad; this extremity is brought to a very keen edge, and two sharp corners; the other end of the instrument is an earpicker, and the instrument is precisely the same as the barbers of Indostan use to cut the nails, and deurate the ears of their customers (for in that country, we are above performing either of these operations over selves). The Operator of inoculation holds the instrument as we hold a pen, and with dexterous expedition gives about fifteen or sixteen minute scarifications (within the compass above mentioned) with one of the sharp corners of the instrument, and to these various little wounds, I believe may be ascribed the discharge which almost constantly flows from the part in the progress of the disease. I cannot help thinking that too much has been said (pro and con) about nothing, respecting the different methods preferred by different practitioners of performing the operation; provided the matter is thrown into the blood, it is certainly, a consideration of most trivial import by what means it is effected; if any claims a preference, I should conclude it should be that method which bids fairest for securing a plentiful discharge from the ulcer.], just making the smallest appearance of blood, then opening a linen double rag (which he always keeps in a cloth round his waist) takes from thence a small pledget of cotton charged with the variolous matter, which he moistens with two or three drops of the *Ganges* Water, and applies it to the wound, fixing it on with a slight bandage, and ordering it to remain on for six hours without being moved, then the bandage to be taken off, and the pledget to remain until it falls off itself; sometimes (but rarely) he squeezes a drop from the pledget, upon the part, before he applies it; from the time he begins the dry friction, to tying the knot of the bandage, he never ceases reciting some portions of the worship appointed, by the *Aughtorrah bhade*, to be paid to the female divinity (Shitaladevi – eds.) before-mentioned, nor quits the most solemn countenance all the while. The cotton, which he preserves in a double calico rag, is saturated with matter from the inoculated pustules of the preceding year, for they never inoculate with fresh matter, nor with matter from the disease caught in the natural way, however distinct and mild the species. He then proceeds to give instructions for the treatment of the patient through the course of the process, which are most religiously observed.”

“He extends the prohibition of fish, milk and ghee, for one month from the day of inoculation; early on the morning succeeding the operation, four *collons* (an earthen pot containing about two gallons) of cold water are ordered to be thrown over the patient, from the head downwards, and to be repeated every morning and evening until the fever comes on, (which usually is about the close of the sixth day from the inoculation,) then to desist until the appearance of the eruptions, (which commonly happens at the close of the third complete day from the commencement of the fever,) and then to pursue the cold bathing as before, through the course of the disease, and until the scabs of the pustules drop off. They are ordered to open all the pustules with a fine sharp pointed thorn, as soon as they begin to change their colour, and whilst the matter continues in a fluid state. Confinement to the house is absolutely forbid, and the inoculated are ordered to be exposed to every air that blows; and the utmost indulgence they are allowed when the fever comes on, is to be laid on a mat at the door; but, in fact, the eruptive fever is generally so inconsiderable and trifling, as very seldom to require this indulgence. Their regimen is ordered to consist of all the refrigerating things the climate and season produces, as plantains, sugar-canes, water melons, rice, gruel made of white poppy-seeds, and cold water, or thin rice gruel for their ordinary drink. These instructions being given, and an injunction laid on the patients to make a thanks-giving *Poojah*, or offering, to the goddess on their recovery, the Operator takes his fee, which from the poor is a *pund of cowries*, equal to about a penny sterling, and goes on to another door, down one side of the street and up on the other, and is thus employed from morning until night, inoculating sometimes eight or ten in a house. The regimen they order, when they are called to attend the disease taken in the natural way, is uniformly the same. There usually begins to be a discharge from the scarification a day before the eruption, which continues through the disease, and sometimes after the scabs of the pock fall off, and a few pustules generally appear round the edge of the wound; when these two circumstances appear only, without a single eruption on any other part of the body, the patient is deemed as secure from future infection, as if the eruption had been general.”

“When the before recited treatment of the inoculated is strictly followed, it is next to a miracle to hear, that one in a million fails of receiving the infection, or of one that miscarries under it; of the multitudes I have seen inoculated in that country, the number of pustules have been seldom less than fifty, and hardly ever exceeded two hundred. Since, therefore, this practice of the East has been followed without variation, and with uniform success from the remotest known times, it is but justice to conclude, it must have been originally founded on the basis of rational principles and experiment.”

“If the foregoing essay on the Eastern mode of treating the small pox, throws any new and beneficial lights upon this cruel and destructive disease, or leads to support and confirm the present successful and happy method of inoculation, in such wise as to introduce, into *regular and universal practice, the cool regimen and free admission of air*, (the contrary having proved the bane of millions,) I shall, in either case, think the small time and trouble bestowed in putting these facts together most amply recompensed.”

One of the curious facts was the inoculation against smallpox disease was practiced in both North and South India till it was banned or disrupted by the English authorities in 1802–1803. The Superintendent General of Vaccines pronounced the ban on “humanitarian” grounds (Dharampal, 1971). A ridiculous excuse to “kill” Indian initiative in controlling smallpox!

In the medieval England, contact with affected person was allowed, hoping that one would escape with a mild case of smallpox. Educated people called it “inoculation” from the Latin *inoculare* (to bud), Greek – *ops*, and from Sanskrit, *aksha* (eye) (see Webster’s dictionary).



As we know from well-documented records, a vaccine (Latin *vacca*, from Sanskrit *vaasha* meaning cow) from the cow, for use in inoculation against smallpox was manufactured by Dr Edward Jenner in 1798. From then on this vaccine replaced the previous “variolus” matter taken from human agents (Dharampal, 1971).

The Chinese avoided direct contact with affected persons. A child was made to inhale a powder made from crusts shed by recovering patients. No definite information on efficacy of this method is known.

**Smallpox in Mexico.** A couple of paragraphs reproduced from Diamond (1999) provide evidence to the key role of smallpox as the main killer of Aztec and Inca people though the Spaniards are called “conquistadors”. Spaniards had luck on their side.

“The Importance of lethal microbes in human history is well illustrated by Europeans’ conquest and depopulation of the New World. Far more Native Americans died in bed from Eurasian germs than on the battlefield from European guns and swords. Those germs undermined Indian resistance by killing most Indians and their leaders and by sapping the survivors’ morale. For instance, in 1519 Cortes landed on the coast of Mexico with 600 Spaniards, to conquer the fiercely militaristic Aztec Empire with a population of many millions. That Cortes reached the Aztec capital of Tenochtitlan, escaped with the loss of “only” two-thirds of his force, and managed to fight his way back to the coast demonstrates both Spanish military advantages and the initial naivete of the Aztecs. But when Cortes’s next onslaught came, the Aztecs were no longer naïve and fought street by street with the utmost tenacity. What gave the Spaniards a decisive advantage was smallpox, which reached Mexico in 1520 with one infected slave arriving from Spanish Cuba. The resulting epidemic proceeded to kill nearly half of the Aztecs, including Emperor Cuicatlhuac. Aztec survivors were demoralized by the mysterious illness that killed Indians and spared Spaniards, as if advertising the Spaniards’ invincibility. By 1618, Mexico’s initial population of about 20 million had plummeted to about 1.6 million.”

“Pizarro had similarly grim luck when he landed on the coast of Peru in 1531 with 168 men to conquer the Inca Empire of millions. Fortunately for Pizarro and unfortunately for the Incas, smallpox had arrived overland around 1526, killing much of the Inca population, including both the Emperor Huayna Capac and his designated successor. As we saw in Chapter 3, the result of the thrones being left vacant was that two other sons of Huayna Capac, Atahualpa and Huascar, became embroiled in a civil war that Pizarro exploited to conquer the divided Incas.”

## Jaundice

There is clear reference to jaundice as *hariman* disease in Rigveda (c. 8000 BC) (Sharma, 1991). Encyclopaedia Britannica (1993) states, “first record” of hepatitis by Hippocratic School in 200 BC.

The specific verse in Rigveda (c. 8000 BC), when translated reads as “O’ Sun! You have the light that is beneficial to everyone. Today you rise and climb high in the sky to eradicate my heart disease as well as *harimaan*. I shall transfer my *harimaan* disease to parakeet and turmeric” (Rigveda 1:62:9).

**Treatments for jaundice.** Treatments have been prescribed for jaundice since the time of Charaka (c. 700 BC) (Vidyalankar, 1994). By the time of Charaka, the jaundice was specifically called *kamala*. A couple of prescriptions are given below:

1. Take powder of *lauhabhasma* (iron ash), *haritaki* (*Terminalia chebula*), and *haridra* (turmeric) mixed together with honey and ghee.

2. Mix *dhatri* (*Emblica officinalis*), *lauhabhasma* (iron ash), *trikatu* (dry ginger, long pepper, and black pepper), and turmeric together and administer with honey and ghee. It is claimed to alleviate even the severe jaundice.

In addition, *punarnava* (*Boerhaavia diffusa*) is also used. Incidentally this herbal has recently been found to be antiviral in plants (Awasthi and Verma, 2006).

## Influenza

The name influenza, which originated in 1743, is derived from “influence” of stars. It is an Italian word (see Webster’s dictionary). The Encyclopaedia Britannica (1993) mentions “first clear description is of 1610” but fails to point the source. Jahangir’s memoirs (1605–1622) give accurate description of influenza, which is quoted below:

“In these days (1618) in consequence of the great heat and the corruption of the air, sickness had broken out among the people, and of those in the city (Ahmadabad) and the camp there were few who for two or three days had not been ill. Inflammatory fever or pains in the limbs attacked them, and in the course of two or three days they became exceedingly ill – so much so that even after recovery they remained for a long time weak and languid. They mostly at last recovered, so that but few were in danger of their lives. I heard from old men who resided in this country that thirty years before this (1588 AD?) the same kind of fever prevailed, and passed away happily. Anyhow, there appeared some deterioration in the climate of Gujarat, and I much regretted having come here.” (Nene, 1998a)

Severe influenza epidemics have been recorded, of which those of 1888–89, 1918–19, and 1957 were devastating. In the epidemic of 1918–19, of the 20 million people who died worldwide, 12.5 million died in India alone.

## Concluding remarks

Viral epidemics have demonstrated their potential to cause mass destruction of plants, animals, and humans. These have been serious in the past and can be even more serious in future, unless virologists remain continuously alert about emergence of new viruses and/or their strains.

Biological warfare has been a reality in the ancient and medieval periods, and deliberate use of biological entities, natural or bred specifically, is a real possibility in the current world scenario.

There seem vast opportunities for intensive research on the use of herbals in management of viral diseases.

Science of the colonized countries, such as India, was deliberately ignored or suppressed by Imperial powers of the 18<sup>th</sup> and 19<sup>th</sup> centuries. We in India can rediscover the suppressed information (e.g., smallpox inoculation) and highlight it in our textbooks.

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