



*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*

# **WIDER WORKING PAPERS**

## **Smallpox in Two Systems of Knowledge**

**Frédérique Apffel Marglin**

**WP 17**

**Revised, July 1987**

*Prepared for the UNU/WIDER Planning Meeting on  
Systems of Knowledge as Systems of Domination  
21-23 July 1987*



## SMALLPOX IN TWO SYSTEMS OF KNOWLEDGE

Frédérique Apffel Marglin

Revised, July 1987

Prepared for the UNU/WIDER Planning Meeting on  
Systems of Knowledge as Systems of Domination  
21-23 July 1987

I wish to express my deep gratitude for the excellent field research continued by Purna Chandra Mishra; for the intelligent and stimulating work of my research assistant at Smith, Gillian Goslinga; and for Elizabeth Tuchscherer's translation of Rösel's book from German to French.

## CONTENTS

	<u>Page</u>
INTRODUCTION	1
 PART I: SMALLPOX IN TWO SYSTEMS OF KNOWLEDGE	
A: Variolation: indigenous disease control	6
B: Resistance to Vaccination in India	14
C: Socio-political and Moral implications	24
 PART II THE EFFICACY OF RITUAL	
A: The land, the body, the body politic	29
B: A System of thought in practice	34
C: The body and the body politic in ritual	39
 PART III AIDS AND THE ERADICATION OF SMALLPOX	45
 CONCLUSION	48
 FOOTNOTES	53
 REFERENCES	54

## INTRODUCTION

The present essay is an attempt to challenge science's claim to be a superior form of knowledge which renders obsolete more traditional systems of thought. Today the attribute of "non-scientific" is often used synonymously with that of "irrational". A system of knowledge which makes no distinction between naturalistic forms of explanations and religious forms of explanations is deemed by science to be irrational and inferior. The particular form of the scientific discourse which this paper will critically examine is the medical scientific discourse as does the paper by Nandy and Visvanathan in this volume. Other papers in the volume critically appraise the scientific discourse in the areas of ecology (Guha), modernization and economic development (Banuri), work organization and scientific management (S. Marglin) and agricultural development (Appadurai).

Although the scientific medical system of knowledge has come under critical appraisal by several scholars (Canguilhem, 1978; Foucault, 1975; Illich, Turner, 1984) it has much more rarely been the focus of challenge in the context of development studies. In this realm, the scientific medical system by and large is spared this scrutiny because of the fairly widely shared belief that it is superior to other methods.

For my critical appraisal I have deliberately chosen a case which is seen as an unqualified success: the eradication of smallpox. The resounding success of the World Health Organization to eradicate smallpox worldwide - achieved officially in 1977 - has produced several scholarly studies on the history of smallpox. Before Jenner's discovery of vaccination with cowpox at the end of the 18th century there existed several traditional methods of coping with and containing the disease. The method which will be examined in this paper is the one employed in India, called 'variolation' or 'inoculation'. This consisted in inoculating healthy persons by pricking the skin with a needle impregnated with human smallpox matter, whereas vaccination uses cowpox matter. The technical operation was accompanied by worship of the goddess of smallpox. The two aspects of the treatment were not experienced or thought of as being separate or as belonging to two different modes of thought and action.

Vaccination was brought to India shortly after it was discovered in England, in the very first years of the 19th century. There, unlike in Europe and the Americas, it did not displace variolation which was preferred by the bulk of the Indian population. In spite of several reports by British physicians reporting on the efficacy of variolation for controlling smallpox epidemics, the British government in India outlawed variolation in 1865. This action by the colonial government dealt a death blow to the practice and knowledge of the variolators which has irretrievably disappeared. The present study questions the validity of the view that considers the loss of such knowledge no real loss since it has been supplanted by a superior form of knowledge, that of vaccination and of scientific medicine generally.

The colonial government after outlawing variolation proceeded to make vaccination compulsory in several provinces. Resistance to vaccination became a political phenomenon protesting an alien rule and the imposition of an alien practice. After independence in 1947 the government of India made smallpox vaccination the top priority of its public health program. The popular resistance to vaccination continued. It has been seen by both foreign experts and governmental experts and administrators as evidence of the obscurantist and superstitious nature of India's masses. During the colonial era the modern system of knowledge was imposed by fiat. After independence the domination of this system continued, in the case of smallpox control, by default since indigenous knowledge was lost. However, it is doubtful that even if variolation had not disappeared, the modern experts and administrators of India's independent government would have considered it as a real alternative. The scientific system of knowledge today is prevalent in the world of development experts and the élites of the new nation states of the third world. It is a system which takes as axiomatic the separation between rational thought and beliefs in "supernatural beings".<sup>1</sup> Since the resistance to vaccination in India was in the name of the goddess of smallpox, it was labelled obscurantist and superstitious. Such a position needs to be challenged not only because it is fallacious but also because it is dangerous (as well as morally arrogant).

Let me make myself clear on the nature of this danger. It is of three kinds; 1. a political danger; 2. a social and moral danger; and 3. a physiological health danger. Let me take each of these in turn.

1. There are two aspects to the political danger of labelling resistance to vaccination obscurantist and superstitious. The first aspect concerns the fact that the targetted population has no voice in the decision-making process. In other words it is disenfranchised. It becomes objectified as the targetted recipient of a practice which those in power know is good for them, whatever the people may think about it. The confidence of those in power about the goodness of what they forcefully administer stems from the self-confidence of scientific medical experts in the unquestioned superiority of their form of knowledge.

The second aspect has to do with the people's reaction to the attitudes and practices of those in power which has the effect of marginalizing other, more traditional forms of thought and action. Development plans make no room for these. As Appadurai's paper shows, the increasing modernization of agriculture in the Maharashtrian village he discusses has crowded out the cultivators' ritual calendar. In the face of such marginalisation, practitioners of older forms of thought and action tend to react defensively, often rigidifying and reifying their practices. Fundamentalism is a world wide phenomenon which has been related by several scholars (see especially Banuri's paper in this volume) to these processes. Traditional religious practices, far from disappearing, are on the contrary asserting themselves quite visibly and often aggressively. Religious buildings are multiplying at an increasing pace; for example their number in Delhi has risen from 580 in 1980 to over 2000 in 1987 (India Today, June 15, 1987). Closer to the issue at hand, today in a working class industrial suburb of Calcutta, Salkia, the goddess of smallpox is worshipped annually in great pomp, attracting tens of thousands of worshippers (A.N. Sarkar 1986). The predictions of the modernizers have been totally confounded. With the eradication of smallpox in India in 1977, Śītalā, the goddess of smallpox has not only not vanished but has made a spectacular comeback in the heart of an industrial urban center. Adherence to her cult may no longer be read as a cultural-political protest against an alien power but perhaps can be read as a reaction to those in power today - intellectual heirs to the

alien British - and their efforts at marginalising such expressions of popular religiosity.

2. Rituals clearly are performed not only as a form of political protest but also for more positive reasons. Rituals are forms of symbolic communication which achieve something. Rituals are efficacious social and moral actions (Tambiah, (1979) 1985). However to have access to the positive, efficacious aspects of ritual, a scientific methodology which radically separates rational thought from beliefs in "supernatural beings" will only yield a confirmation of such action as being irrational. Another methodology is needed, namely semiotics, the analysis of systems of signification. Such an endeavor is essential not because of an antiquarian interest or an interest in the exotic but because rituals do precisely what the processes of modernity fail to achieve or even actively destroy. Rituals achieve essentially two results: they bring about what Bellah et al have called social ecology (1985:283) and they enable individuals and communities to confront and integrate suffering and death and thereby achieve regeneration of self and community. Let me briefly amplify on each of these achievements of rituals.

a. In their much acclaimed recent best-seller, Habits of the Heart: Individualism and Commitment in American Life, (1985), the sociologist Robert Bellah and his collaborators argue that modernisation has produced social fragmentation and anomie in the United States. Their assessment of modern trends is pessimistic and they urge that

...if we are ever to enter that new world that so far has been powerless to be born, it will be through reversing modernity's tendency to obliterate previous culture. We need to learn again from the cultural riches of the human species and to reappropriate and revitalize these riches so that they can speak to our condition today (Ibid: 283).

Modernisation has the same effect in the third world. But there, older forms of thought and action have survived much more vigorously than in America. Before wishing to relegate such modes of thought and action to well-deserved oblivion, one must realize that they appear obsolete or irrational only from the perspective of a certain system of knowledge with its own methodology. Employing a different methodology, rituals and other

expressions of older forms of thought and action can reveal their wisdom and yes, even their utility. In the second part of this paper this is attempted for a contemporaneous large ritual of state which is also a smallpox healing ritual.

b. The issue of suffering and death is relevant to our concerns here not for philosophical or theological reasons but for much more practical reasons. The theories of a prominent social analyst of our times, Robert Jay Lifton (1979) has shown the connection between death denial or numbing and mass violence, genocide and nuclearism. Our century's catalogue of horrors - Hiroshima, Auschwitz, and Vietnam to name only some - has been said to have surpassed earlier times in the magnitude of the violence. Lifton's scholarship has immersed itself in all of these deeply and his conclusions about the link between death denial and mass violence do not spring from abstract philosophico-theological cogitations but from a minute and relentless immersion in all the painful and gory facts (Lifton 1973, 1976, 1986). The scientific medical system of knowledge singularly fails to allow individuals and communities to integrate and confront death, as it will be argued in this paper.

3. The latest scientific discoveries surrounding the saga of the world-wide eradication of smallpox bear on a link between it and the activation of a previously dormant Aids virus. This latest discovery has been advanced by several Aids researchers and is currently the focus of debate in the scientific medical community. It may turn out that the danger of separating rationality from morality and other aspects of religion is not only threatening social and political health but the physiological health of populations as well. As the historical evidence on variolation in India shows, the separation between rationality and religious beliefs is not only not necessary to efficacious and intelligent action, but it may turn out to be a serious obstacle to any kind of ultimately efficacious action. The last part of the paper will summarize these latest scientific developments linking the Aids epidemic to the eradication of smallpox.

The three parts into which this paper is organized will investigate in turn the political, the social cum moral, and the technical-physiological aspects of the efforts at controlling smallpox. Smallpox will be examined both historically and contemporaneously in two systems of knowledge: the scientific medical one and the traditional Indian one.

## **PART I: SMALLPOX IN TWO SYSTEMS OF KNOWLEDGE**

### **A. Variolation - Indigenous Disease Control**

Long before Jenner's discovery of vaccination using cowpox matter in 1798, there is evidence for the widespread use in several parts of the world of variolation (also called 'inoculation'). This method utilizes human smallpox matter to inoculate susceptible persons previously unexposed to the deadly form of smallpox; "the inoculee gets an attenuated case of smallpox -- lower fever and less exanthema which is very rarely fatal and confers immunity from further infection" (Greenough 1980:345). It differs chiefly from vaccination in that an inoculated person is fully contagious whereas a vaccinated person is not.

Variolation appears to have been brought into Europe during the 17th century and is recorded to have been a folk practice among Polish, Greek, French, and Welsh peasants (Hopkins 1983:46; History of Inoculation and Vaccination: 1913). The folk practice, called "buying the smallpox" was not known in urban centers where the only method relied upon to control epidemics of smallpox was isolation and quarantine. At the turn of the century several reports of vastly more effective methods of disease control reached British physicians. In 1700 two reports reached the Royal Society describing the Chinese method of inoculation. This consisted of blowing the dust of powdered scabs from persons previously infected with a mild case of the disease into the nostrils of the susceptible person. In 1714 a fellow of the Royal Society read a report of inoculation practices in Constantinople communicated to him by an Italian physician residing in that city. This consisted in scarification of the skin in 2 to 5 places with a needle until some blood appeared and dropping in those places from a bottle variolous matter freshly taken from the pustules of a naturally infected person (Hopkins 1983:46).

This method was said by the Turks to have been introduced from Circassia (Northeastern part of the Black Sea) some forty years earlier. The method is identical to the one employed in the Arab world from the westernmost part of Africa to the Middle East. In 1726 Dr. Russell, a British physician residing in Aleppo, reported this same method from a

female Bedouin informant who called it "buying the smallpox." He found that the practice was known to older people who remembered having heard of the custom from their elders (History of Inoculation and Vaccination 1913:30-31).

The similarity in inoculation technique and in the name for the practice -- "buying the smallpox" -- points to the Arab origin of this folk European practice reported as early as the second half of the 17th century from the northern shore of the Black Sea, to the western part of North Africa.

The earliest report of variolation from India dates from 1731 (Dharampal 1971:141-42 cited in Nicholas 1981:28). It is described by one Robert Coult in a letter to a relative in England:

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.

The feaver insues 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 of before the feaver comes on and frequently use cold bathing.

From the description the technique seems to be identical to the Arab one. A later report (1767) by the British physician Holwell, describing like Coult, variolation practices in Bengal, reports what seems to be an improved version of the practice; scratching the skin with a needle, the variolator uses a piece of "cotton, which he preserves in a double callico 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." (Dharampal 1971:150-53). Throughout the operation, the inoculator continuously recited the worship of the Smallpox Goddess, *Guṭikā Ṭhākuraṇī*. (Nicholas 1981:29). This represents a new and third method which seems to greatly lower the chances for the spread and eruption of the

more severe form of the disease. This safer method never seems to have been introduced in Europe.

No student of the history of smallpox has been able to identify definitively where and when variolation was invented. The three techniques discussed would seem to point toward multiple discovery. Given the trade links between the Arab world and India (Obeyesekere 1984:530-535) and the existence in both these worlds of similar techniques, diffusion from one to another is possible. Dr. Donald Hopkins of the Center for Disease Control in Atlanta, who himself participated in the WHO campaign to eradicate smallpox, leans in his history of smallpox towards India as the originator of the scarification method of variolation: "It is almost certain, however, that inoculation with smallpox virus was practiced in India in ancient times." (p. 17) He bases this opinion on a quote by a British army officer, Colonel King, said to be a translation from a text on variolation with both cow and human pox attributed to Dhanwantari, some two thousand years before Jenner: "take the fluid of the pock on the udder of the cow and on the area between the shoulder and elbow of a human subject on the point of a lancet, and lance with it the arms between the shoulders and elbows until the blood appears. There, mixing this fluid with the blood, the fever of the smallpox will be produced (History of Inoculation, 13-14)." Since there is no other evidence of cowpox vaccination having been practiced in ancient India, the validity of this description seems doubtful (Hopkins 1983:17).

Hopkins echoes here the opinion of Lord Amphilhill, Governor of Madras, expressed in an address on the occasion of the opening of the King Institute of Preventive Medicine in Madras in 1905 (History of Inoculation:14). The attribution of the text to Dhanwantari, the mythical first Indian doctor to whom two of the earliest Ayurvedic texts (Súśruta Samhita, Caraka circa 400 A.D.) is attributed cannot be taken literally. Texts used by variolators have been reported (see Nicholas 1981:29) and it is very possible that such texts existed in Madras Presidency around the turn of the 19th and 20th century. Attributing texts to mythical authors is a fairly widespread practice in India, which cannot help us by itself to date such texts with accuracy. The German scholar Julius Jolly is of the opinion that "The often expressed view that smallpox existed in India much earlier than in Arabia and that it reached Arabia from India is thus in no

way to be considered as certain; still less acceptable is the view of Chevers that the priests of Śītalā were the oldest vaccinators. No trace of any vaccination can be discovered in older medical literature. (Note 1: The Sanskrit citation on vaccination communicated by Ainslie is evidently a modern falsification.)" (Jolly; 1977:115-116).

In his careful historical study of Indian medical texts bearing on smallpox Nicholas concludes that by the 16th century in India there were only an humoral and a theurgic (i.e. divine causation) explanation of the disease. Variolation is not mentioned. It must be pointed out though that Nicholas' study is based on Sanskrit and Bengali sources. It is possible that Colonel King working in Madras Presidency at the turn of the 19th and 20th century had access to Tamil texts which have yet to be thoroughly researched.

There is a further point to be made -- namely, the possibility that a non-textual popular tradition concerning variolation may have overlapped with a more elite textual tradition. Smallpox inoculators have been recorded as belonging to non elite, popular social milieu; Hindu and Muslim cultivators in Dinajpur District, garland-makers and barbers in Dacca and specifically not high caste Vaidyas, low ranking astrologer Brahmins in Serampore, and barbers. Risley (1891) reports that the latter "possess a textbook, Vasanta-tika (smallpox inoculation), but few study it" (Nicholas 1981:28-29). Holwell does report that "a particular tribe of Bramins" were inoculators in 18th century Bengal but Nicholas points out that such a job requiring bodily contact with heterogeneous persons is not an estimable occupation for a Brahmin. Since the procedure requires drawing blood this would further lower the status of these Brahmins practicing inoculation. Even those groups, such as the barbers, who have a textual tradition, do not seem to primarily rely on it. This is similar -- in my experience -- to dance teachers in Orissa whose tradition is recorded in vernacular (as well as Sanskrit) texts, but who rely seemingly exclusively on oral transmission.

As Zimmermann has shown, the low status oral medical traditions which involve the drawing of blood, operations, and generally non humoral, i.e., non "expectant" practices are part of an ancient orthodox medical discourse

which he terms the "operative" discourse. He sees within the Indian medical tradition from the earliest textual evidence a double, seemingly contradictory discourse. The expectant model is today associated with such Brahmanic practices as vegetarianism and non violence. The operative model, characterized by empirical observations of anatomical facts and the fulfillment of practical tasks, is today associated with low ranking castes but is heir to an older tradition connecting the physician with the king, war, and the shedding of blood (Zimmermann 1978:100).

The practice of inoculation which involves empirical observations, the fulfillment of a practical task, the drawing of blood and which is carried out by low status persons who depend primarily on oral transmission of their knowledge does seem to fit in well with Zimmermann's "operative" model. Zimmermann's work sounds a note of caution for those who would too hastily dismiss the possibility that the practice of variolation in India is much older than its reported existence at the turn of the 17th and 18th century and may have existed much earlier even though it is not mentioned in any Sanskrit or Bengali medical texts up to the 16th century.

How effective was variolation as a method of disease control? According to the method employed the risk of death from variolation varied between 1 to 3 per 100; this contrasts with a death rate in naturally acquired variola major during epidemic phases ranging between 1 in 2 to 1 in 6 persons. There is no question that variolation was a most impressive discovery.

In 1723 Dr. James Jurin presented to the Royal Society of London a statistical study of the impact of variolation in England. Jurin concluded that: "the risk of dying from smallpox was about two out of seventeen, and that in recent epidemics of smallpox, about one out of every five or six victims died. In comparison, he showed that only one out of every 91 persons inoculated in England died of smallpox inoculation." (Hopkins 1983:50). In terms of epidemic control, Razzell's social historical research attributes the increase in life expectancy at birth in 18th century England to the introduction of inoculation. However, he shows that epidemic control due to inoculation was substantial in rural areas but spotty in urban areas (Razzell, 1977 in Hopkins, 1983:76).

Razzell's work on variolation in 18th century England converges with the reports by Dr. Buchanan-Hamilton at the beginning of the 19th century from India, where during epidemic phases of the disease only about 1 in 100 persons died since variolation was generally diffused (Greenough 1980:346). Razzell's evidence for 18th century England and the evidence for 18th and early 19th century India shows that variolation when practiced fairly extensively in the population was an impressively effective method of controlling the disease. A survey of Bengali villagers in 1850 reveals that 81% of the population had been variolated (Greenough 1980:347). This can be compared to the figures of the early 1960s government of India smallpox eradication program where the target was to vaccinate 80% of the population of the country. It was assumed that the immunity level thus achieved would be sufficient to stop natural transmission of the disease. The target was not reached; an assessment of the program by the National Institute of Communicable Diseases in Delhi in 1963 found that recorded figures for both vaccination and re-vaccination were much higher than those found in the surveyed population (Basu, Jezek, Ward 1979:23). Since the recorded figures show that 68% of the population was vaccinated between 1962 and 1965, many of these were re-vaccinations and the percentage of newly vaccinated persons must have been a great deal lower (Gelfand 1966:1640).

One of the criticisms made after Jenner's discovery was that variolation would spread the acute forms of smallpox to susceptible persons by natural contagion. Greenough states that: "This question is answered in the negative by Razzell. He argues, with considerable evidence, that when large numbers were regularly inoculated in rural areas -- areas where the bulk of the population had been previously exposed to smallpox or variolated -- there was little chance for variolation to increase the rate of natural infection." (Greenough 1980:345 referring to Razzell 1977:26-33)

Razzell's study of 18th century England corroborates Holwell's view regarding variolation in 18th century Bengal; the latter states that "notwithstanding the multitudes that are every year inoculated in the usual season it adds no malignity to the disease taken in the natural way, nor spreads the infection, as is commonly imagined in Europe" (Holwell J.Z. 1767 in Dharampal 1971:144, cited in Greenough 1980:346). It must be kept in mind that the technique of inoculation reported by Holwell to be in use

in Bengal was of the three techniques so far reviewed, the safest since it used variolated matter only from the pustule of previously inoculated persons, thus greatly increasing the chance for a mild case to occur in the inoculee. This method seems to have been current only in India since the European, Turkish, Arab and Chinese method all used variolated matter taken from a person having caught the disease by natural means; even though the Chinese did take care to choose only mild cases for their variolation matter.

Besides being efficient, variolation in Bengal was also cheap, popular and common:

"The tikadār [variolor], we are told, goes 'down one side of the street and up the other, and is thus employed from morning until night, inoculating sometimes 8 or 10 in a house' (Holwell 1767 in Dharampal 1971). This intense intra-village coverage, combined with the movement of tikadārs throughout Bengal, Bihar and eastern Uttar Pradesh as described, leads one to think inoculation was perceived to be effective." (Greenough 1980:346)

Jenner's vaccine was introduced in India early in the 19th century but as the 1850 survey of Bengali villagers revealed, the overwhelming majority of the population continued with the traditional variolation rather than with vaccination; the traditional method flourished until the colonial government outlawed it in 1865 (Greenough 1980:347).

Jenner's discovery grew out of the practice and knowledge gained from inoculation in 18th century England. One historian of variolation has rather preposterously characterized this practice as the "chief medical contribution of the Enlightenment." (G. Miller 1957 cited in Hopkins 1983:77). The medical establishment in Europe lagged behind folk practice by over half a century and behind the adventurous spirit of Lady Montague who was the first member of the European elite to use inoculation in her family. She was the wife of the British Ambassador in Constantinople and had witnessed the practice there, where inoculation was carried out by old women. She had her son inoculated in Constantinople -- albeit by the embassy surgeon -- in 1718 and her daughter in 1721. Her attitude contrasts sharply with that of one contemporary British doctor, Dr. William Wagstaffe, who around that time wrote the following gem of European ethnocentricity and sexism:

"Posterity will scarcely be brought to believe that a method practiced only by a few Ignorant Women, amongst an illiterate and unthinking People should on a sudden, and upon a slender Experience, so far obtain in one of the most Learned and Polite Nations in the World as to be received into the Royal Palace (Stearn 1950:115 cited in Hopkins:47).

This was written at a time when independent reports of the Chinese, Turkish and Arab method of variolation were being received by European physicians. The turn of the 17th and 18th century was according to historians a period of terrible smallpox epidemics. In the face of these two factors Hopkins is moved to remark that "[t]he failure of European physicians to respond immediately to these efforts [...] is curious." (p. 46).

By the end of the 18th century, inoculations had been accepted by British physicians and Jenner was an inoculator who had himself been inoculated as a child of eight. While he was studying surgery and pharmacy as an apprentice in 1762 in Sodbury he learned from a country girl that she could not be infected with smallpox because she had already had the cowpox. Such knowledge had apparently been common among peasants in England for over a century. He experimented on his own children by inoculating them with cowpox matter and then noticing that a subsequent smallpox inoculation produced no result (Hopkins:77-78). Clearly the technique used by Jenner as well as the theory of infection pertaining to it was that of variolation. Combining this with folk knowledge concerning the relationship between cowpox and smallpox enabled him to achieve his famous discovery. This continuity between variolation and vaccination is not only manifested in the realm of biological knowledge but sociologically as well. As Hopkins notes:

"...the experience with inoculation as an effective specific tool against smallpox, in Europe and North America especially, enabled inhabitants of those two continents to exploit Jenner's vaccine almost as soon as it was discovered. In that sociological, non biological sense, Jennerian vaccination was not an abrupt break with the past, but the direct descendant and heir of inoculation." (Hopkins:77)

Given the similarity in technique, and type of knowledge involved in variolation and vaccination, the Indians' strong preference for the former during the 19th century and the reported resistance to vaccination in India

during the 20th century cannot easily be attributed to blind adherence to superstitious tradition or obscurantism as has often been done (see Mather & John's view about the need to remove the superstitious belief in a smallpox goddess for effective treatment of the disease, 1973:195).

## B. Resistance to Vaccination in India

In order to approach the topic of the resistance to vaccination in India, we need to summarise our understanding of the history of indigenous knowledge and practice concerning smallpox in India. Smallpox as a disease is named and described in the earliest Sanskrit medical treatises, those of Caraka and the Suśruta Samhita which scholars date in the 4th century A.D. The disease is called masūrikā from a word meaning 'lentil' or 'pulse' since the boils resembled in color and shape a local variety of that legume (Suśruta, Ni. 6, 18; Caraka, Ci 12, 93). In those earliest texts and in later commentaries to those texts such as the 8th century Nidāna of Mādhava-Kāra and the text by Ḍalhana of the 11-12th centuries, the treatment of smallpox belongs to the ancient ayurvedic system of humoral explanation and consists of diet and external efforts at restoring imbalances between for example hot and cold. There is no mention of variolation or of the goddess. By the 12th century, Sanskrit texts such as that of Ḍalhana, give another name for the disease which are all variants on the word śīṭala meaning 'cold' or 'cool' such as śīṭalā, śīṭalikā and śīṭalī (Meulenbeld 1984:91).<sup>2</sup> By the end of the 15th century, beginning of the 16th century another Sanskrit text, an appendix to the 8th century Nidāna of Mādhava-Kāra, mentions for the first time that the disease is caused by the goddess Śīṭalā (Nicholas 1981:26). Can we conclude from this textual evidence that smallpox was not connected to the goddess of smallpox Śīṭalā until the end of the 15th century? Probably not. There is iconographical evidence from the 9th century in Rajasthan for the existence of such a goddess (see Plate 23 in Hopkins). By the 12th century there are several instances of iconographical representations of goddess Śīṭalā (Nicholas 1981). Since in Ḍalhana's 12th century text the disease's name is changed to śīṭala or variants of that word, I think it is safe to assume that in practice smallpox was connected to the goddess Śīṭalā at least since the 12th century.

The earliest mentions of variolation come from Europeans in India and date from the early 18th century. Variolation as a method of controlling epidemics was associated with the worship of the goddess of smallpox who was believed to cause the disease. The tradition of the variolators is a vernacular, predominantly oral, and low status one, contrasting with the earlier Sanskrit textual tradition. What needs to be emphasized is that since at least the 12th century, a naturalistic dietetic-cum-humoral understanding of the disease was associated with the worship of a goddess of smallpox and that in the 18th century another naturalistic understanding of smallpox had created the practice of variolation which was also associated with the worship of the same goddess.

It is well to point out once more that the religious language concerning smallpox, the humoral theory and the technique of variolation with its implicit knowledge of infection and contagion, were thought of and experienced as a unified field. There is absolutely no evidence for speaking of a naturalistic discourse contrasted and opposed to a religious discourse.

As Nicholas emphasizes, this evidence makes it clear that the cult of a goddess of smallpox did not prevent or displace two naturalistic understandings of the disease. Quite the contrary; indigenous medical treatment of smallpox in India was associated as far back as the 12th century with the worship of Śītalā. In the 18th and 19th century impressively effective practices of inoculation and epidemic control are similarly associated with the worship of the same goddess. Since more often than not the reported resistance to vaccination has been in the name of Śītalā, it is necessary, before going any further into the nature of this resistance, to investigate more precisely the nature of the link between a religious discourse and a naturalistic discourse on smallpox.

Even though the link between Śītalā and a humoral explanation of smallpox is not seen in the classical (and earliest) ayurvedic treatises, these texts exhibit a "constant desire to justify material activities and physical processes by considerations borrowed from the surrounding tradition, and which in the final analysis belong to the religious domain" (Zimmermann 1982:224; my translation). But as the whole of Zimmermann's

book on Ayurveda abundantly attests, the human and what Westerners would call the "supernatural" are merely continuations and refinements of the natural. Our familiar Western oppositions between the natural and the supernatural or between nature and culture are dissolved. In the ayurvedic discourse it would be doing violence to its vision of reality to speak of naturalistic versus religious explanations of disease.

The human body and the earth are both irrigated by fluids. The drainage of the human body (i.e., medicine) and the cultivation of drained land are a single theme. Vegetal growth, i.e., agriculture, human growth or maintenance of health, and the worship of deities are all part of a single chain of being where the continuities are assumed by processes of cooking and mixing of essences (rasa). Sun, water, and wind (i.e., fire, water, and air) in the right combination assure growth of vegetation, cooking, digesting, and the transmission of the oblations to the deities. Fertility of the land, life, and the blessings of the gods all depend on the same principles of proper congruence between these three elements in each of the three realms. Furthermore, the human body is sustained by the land, its fauna and flora, and the gods are sustained by the food offerings from humans. Humans through the kitchen fire and the digestive fire (bile, one of the three humors), the cooking water and the water in the body (phlegm, another humor), the air which keeps the fire burning and the air in the body (wind or breath, a third humor) appropriate their environment into themselves. The right kind of appropriation, or one could say the right way of absorbing one's environment depends on a congruence between corresponding elements, vital fluids (saps, essences and such), and substances, between the land and the body. The link between the three major realms of environment, humans, and deities are the transformations such as cooking (sanskāra) and combining (samyoga) which enable humans as well as deities to be sustained. There is a continuous "chain of beings which rises from the sap which plants extract from the soil up to the gods who nourish themselves from the fragrance emanating from the sacrificial fires." (Zimmermann 1982:198)

This grossly simplified summary of Zimmermann's study will hopefully be sufficient to alert the reader to the absence of a nature/supernature or nature/culture dualism in India (See also Egnor, 1978; Daniel, 1984). When

we narrow our focus on the workshop of Śītalā as a healing cult we must shift our attention from the level of general conceptual structures to the level of language. In later Sanskrit medical texts the disease itself is called Śītalā and in everyday discourse the person suffering from smallpox is spoken of and to as if she or he were the goddess herself. Treating the patient and worshipping the goddess are one and the same set of actions and words.<sup>3</sup> The diseased person male or female is addressed as "mother" (mā); he or she is offered cooling drinks and food, leaves of the neem tree which are said to be cooling as well as being a disinfecting agent.<sup>4</sup> In other words, the patient is offered the same substances which the goddess might simultaneously be offered in her temple, as well as being spoken of and to as if he or she were the goddess herself.

Suffering from the disease can be spoken of in terms of an excess of heat, the pustules being the visible signs of an overboiling blood erupting through the skin and the fever the immediate indication of an excess of heat escaping from the body. It can also and simultaneously be spoken of as the anger of the goddess. In the continuous chain of beings material substances transform and refine themselves (samskāra) into feelings, thoughts and consciousness (Egnor 1978:131). Anger is an excess of heat; heat is fire; heat is bile; heat is the sun. Heat out of congruence is disease, which is the anger of the goddess. The distinction between the literal and the metaphorical is blurred to the point of being dissolved; it is replaced by what Daniel has called "figurative reality." One should not assume from this that Indians are incapable of distinguishing between the literal and the metaphorical but rather that they have an awareness of what the English linguistic philosopher J. L. Austin has called the illocutionary and perlocutionary power of words. Words can do things, can change the world, can create new realities (Daniel 1984:106-108).

It is thus distorting to speak of two indigenous explanations of the disease, one humoral (naturalistic) and one theurgic (religious); we are in the presence of a unified discourse perceived as two through the distorting lenses of Western dualistic conceptual structures. Furthermore, it is clear that the knowledge of some sort of viral infection and of contagion necessary to produce the knowledge of variolation was not experienced as contrasting or conflicting with the other two manners of speaking of

smallpox. Not only did the variolators recite hymns to the goddess while inoculating and had the inoculees recite along with him but the inoculees had to prepare themselves before the visit of the variolator by following a cooling diet which they continued for a prescribed period after the inoculation (Coult in Dharampal 1971:141-142 cited in Nicholas 1981:28)

Resistance to vaccination on the grounds that it would offend the goddess can no longer be interpreted as indicating conflict between religion and/or blind faith in tradition on the one hand and a rational, naturalistic, progressive scientific world view on the other. The language of Śītālā is a variant of what Westerners would call an empirical, naturalistic language of humors, diet and inoculation. It is also well to remind ourselves that when the British outlawed variolation in India in 1865, it was an effective, cheap, popular and grass-root method of disease control. On the basis of the evidence from the early 1960s vaccination campaigns, India did not approach this effectiveness until the 1970s when WHO in collaboration with the Indian government successfully eradicated smallpox in India by 1977.

It will be my contention in the remaining part of this section of the paper, that the resistance to vaccination was essentially of a political nature. Nicholas' research has shown that beginning in 1750 in Bengal there took place a sudden outpouring of vernacular hymns and ritual texts pertaining to Śītālā most of which written in Western Bengal. The marked increase in literary works elaborating on the mythology of Śītālā was of such a magnitude that according to Nicholas the status of Śītālā shifted from that of a minor deity to that of a major one. He is able to show that this phenomenon correlated with major smallpox epidemics which ravaged this area of Bengal between the 1740s and 1770s. Politically this was a period of major upheavals which saw the collapse of the Mughal empire and a countryside ravaged and profoundly disrupted by Maratha and English armies. After their victory at Plassey in 1757 the British took control of the two western districts of Bengal: Burdwan and Midnapur. Pillaging by Maratha cavalry, increased pressure on the cultivators from British revenue collecting, a severe drought in 1769, all built up to a major famine and smallpox epidemic in 1770 in which 10 million people are said to have died

(Sinha 1967:88 cited in Nicholas 1981:33). A contemporary Dutch naval commander wrote the following of this tragedy which he witnessed:

This famine arose in part from the bad rice harvest of the preceding year; but it must be attributed principally to the monopoly the English had over the last harvest of this commodity, which they kept at such a high price that most of the unfortunate inhabitants - who earned only a sou or a sou-and-a-half a day to sustain their family - found themselves powerless to buy the tenth part of what they needed to live.

To this scourge was added smallpox, which spread among persons of all ages and of which they died in great numbers (Stavorinus 1798:125-28 in Nicholas 1981:33).

The increased movement of displaced persons due to invasions, the movement of armies themselves, all contributed to the spread of infection. The relationship between tax collecting, famine and smallpox could not but have been deeply etched in the consciousness of the villagers of Western Bengal.

Political turmoil also disrupted the annual work of the variolators as well as quarantine arrangements for variolated persons. As Nicholas remarks, all these factors transformed a disease into a calamity (Ibid. 34). When revenue extraction pushes the villagers to extreme poverty, malnutrition lowers the population's resistance to infectious disease. Wars disrupt the villagers' indigenous mode of disease control through the regular annual visits of the tikadārs; diet and inoculation fail; all they have left is their capacity to write and sing hymns to the goddess, which the government's destructive activities cannot rob them of.

Even though vaccination was introduced by the British in India at the very beginning of the 19th century, vaccination did not naturally displace variolation in India as had been the case in Europe, since "variolation largely answered the Indian conception of what effective protection should consist in." Greenough further points out that the British physician Buchanan-Hamilton corroborated this "when he found in 1812 in Bhagalpur district that the general adoption of the practice (of variolation) render(s) the introduction of the vaccine of very little importance." (Greenough 1980:347) Variolation was eliminated by governmental fiat. S. O. Foster of the Bureau of Smallpox Eradication Center for Disease Control in Atlanta reports that as late as 1977 in Bangladesh rumors circulated of

house and body burnings of victims of smallpox which was practiced by the colonial government (Foster 1978:448). Customarily the body of a person who died of smallpox was not cremated since it was considered that this would enrage and further exacerbate the heat of the goddess (Hopkins 1983:163). Other rumors recorded in the 19th century reveal that vaccination was associated in people's minds with the government and acceptance of it tantamount to acceptance of foreign rule. Indian priests at Benares were reported at the end of the century to tell of a prophecy "that India would expel the British through the leadership of a black child with white blood. Vaccination the priests charged, was how the English intended to find that child to kill him" (Ibid.:147). Whereas in Ceylon the rumor was that vaccination meant taking an oath in favor of British rule. Such rumors were no doubt fanned by the autocratic behavior of the colonial government in outlawing variolation and then proceeding to make vaccination compulsory in many parts of the country. After independence the government of India made preventive vaccination the single most important activity of its public health agencies. But due to "incomplete coverage of the population and the relative ineffectiveness of liquid lymph vaccine in a warm climate, the disease retained its high endemicity and its tendency to recur periodically in epidemic fashion" (Gelfand 1966:1635).

In 1959 pilot projects were set up to initiate a program of total eradication; by March 1961 they came to an end due to poor results. In 1962 the National Smallpox Eradication Program (NSEP) was created in Delhi. Dr.Gelfand reviewed the operations of this vast bureaucratic endeavor between 1963 and 1965. The target of immunizing 80% of the population was not even approached; massive bureaucratic failures were basically the cause for the disappointing results; these ranged from poorly motivated health workers, to reporting to supervisors vaccinations not performed so as to fulfill an expected quota and avoiding retribution (Foster 1978:148). The recording task seems to have mostly totally broken down; in some cases the registers of recorded vaccination were prepared by copying information from the 1956 electoral rolls (Gelfand:1644), whereas in some other districts "persons deceased for several years before NSEP began were not only registered but were also recorded as being successfully vaccinated!" (Ibid.:1646). Vaccinators were noted on occasion to be not only technically inefficient but abrupt and callous in their approach to people

(Ibid.:1642). As a result of the failure of the program several changes were made. The target was changed to 100% of the population and the target date to March 1966. "Attack phase teams are now instructed to move as rapidly as possible through individual communities, vaccinating as many as possible..." (Ibid. 1639). In other words, response to failure was a more comprehensive and aggressive program. This seems to me to create the ideal circumstances for multiplication of abuses. One of the most vivid reports of forced immunization by government vaccinators backed by police is given by Brilliant & Brilliant (1978:359):

In the middle of the gentle Indian night, an intruder burst through the bamboo door of the simple adobe hut. He was a government vaccinator, under orders to break resistance against smallpox vaccination. Lakshmi Singh awoke screaming and scrambled to hide herself. Her husband leaped out of bed, grabbed an ax, and chased the intruder into the courtyard. Outside, a squad of doctors and policemen quickly overpowered Mohan Singh. The instant he was pinned to the ground, a second vaccinator jabbed smallpox vaccine into his arm.

Mohan Singh, a wiry 40-year-old leader of the Ho tribe, squirmed away from the needle, causing the vaccination site to bleed. The government team held him until they had injected enough vaccine; then they seized his wife. Pausing only to suck out some vaccine, Mohan Singh pulled a bamboo pole from the roof and attacked the strangers holding his wife.

While two policemen rebuffed him, the rest of the team overpowered the entire family and vaccinated each in turn. Lakshmi Singh bit deep into one doctor's hand, but to no avail.

One of the authors of the piece, a former board member of the American Civil Liberties Union muses about "what would happen...if society used force on every dissenter in the name of public health?" (Ibid:6). Another observer reports witnessing a 60 year old vaccinator pursuing an even more elderly woman up a tree to administer vaccination (Morinis 1977:359).

Uniformly, in the literature I have read on the government's smallpox eradication programs, the people's knowledge and beliefs concerning smallpox is opposed to science; those who carry out vaccination were on the whole not part of the communities in which they worked and believed themselves to be representing a vastly superior form of knowledge completely divorced from the conceptual universe of the people they were attempting to immunize. This is in sharp contrast with the practices,

social status and attitudes of the indigenous tikadars of the 18th and 19th century. Such a situation is almost certain to create animosity rather than cooperation; as the WHO report on the eradication of smallpox in India puts it - "[n]ot infrequently a young, aggressive vaccinator would fail to observe the courtesies and respect due these older people, an action which provoked resentment and animosity, rather than cooperation" (Basu, Jezek & Ward 1979:113).

The resistance when voiced in the language of "the anger of the goddess," which it frequently was, should be read as a sign of political resistance to governmental top-down disciplinarian activities. To see it as superstitious, anti-progressive, and ignorant is a quaint ethnocentric or elitist distortion.<sup>5</sup> The many reports in the literature of the resignation of the Indian peasant in the face of smallpox, explained by the fact that it is the grace of the goddess, and the attitude of passivity in the face of this calamity in the name of not angering the goddess, is singularly reminiscent of the stereotype of the passive American Indian. Worsley invites us to unmask the stereotype in the following manner:

Such is the stereotype of Indian passivity and resignation, which are, in reality, neither conservative commitment to entrepreneurial tradition nor a lack of the entrepreneurial spirit, but refusal...when hope-and organization-become possible, refusal becomes resistance, resistance protest, and protest eventually turns into positive demands for alternatives...It is not a search for purely economic opportunity, but far wider: a struggle for the reassertion of the wholeness of the human personality...and a cultural reassertion, too, of the value of long-despised forms of knowledge, from traditional medicine (actually always innovative) to modes of experiencing the world and conceptions of the relationship of humankind to Nature which are often far richer than those either of the West or of a Second World hell-bent on socialist accumulation, meritocratic mobility, and cultural modernization." (Worsley 1984:291-292)

With the advent of the collaboration between the government of India and WHO in 1970, a markedly different strategy was employed to eradicate the disease. One of the most fundamental among the various changes -- both technical and organizational -- which took place in the early 1970s was the shift from mass vaccination to the policy of "surveillance and containment." Based on field experience in Nigeria this new strategy consisted in locating every outbreak of the disease, sending vaccinators in

to contain the outbreak by vaccinating everyone not yet immunized in the vicinity of the outbreak. The necessity for the cooperation of the public became essential. Re-education of public health staff, monetary rewards for reporting cases of smallpox and hiring local villagers to aid health workers in containment were the most important measures taken to achieve cooperation. In an interview I conducted with Dr. Foster in Atlanta I was struck by two things; one was his statement that "resistance totally disappeared when we hired local inoculators" and the other was the absence of any derogatory remark concerning beliefs and practices surrounding Sitala. He and one of his colleagues who had also participated in the eradication program in India, maintained a studiously neutral and non-committal position in regard to the worship of *Sītālā*. This was all the more evident since I asked questions concerning resistance to vaccination due to beliefs in the goddess. He handled my questions by emphasizing the success the Government-WHO program had in winning popular support. In fact, he reported to me having seen a smallpox vaccine needle and vial on an altar of the goddess in Bangladesh in 1974. From his published statements it is clear that the recognition of the "absolute priority need for the public's participation" (Foster 1977:247) prompted an attitude of actively avoiding expressing arrogant or deprecatory attitudes towards the people's practices. Aided by the expert knowledge of anthropologists on information flows in rural India (see Morinis:1980), and by sophisticated marketing-type promotional tactics including dropping leaflets from airplanes and of course cash incentives for reporting as well as studious avoidance of offending people's beliefs in Sitala, the new surveillance and containment strategy proved successful. But certainly according to Dr. Foster, the key ingredient was the ability of the staff of the eradication campaign to create -- artificially and at great cost -- grass-root involvement and support for the campaign. It is well to recognize that this reorientation does not express so much a newly found respect for the people's own systems of knowledge or even a new political endorsement of grass-root participation, but rather consists of an imaginative and effective response to the necessity of involving the public at large which the new surveillance-containment strategy required. The fact that resistance was overcome when local people were involved also seems to confirm my own interpretation, namely that resistance was basically a political phenomenon in a religious garb.

India was officially declared smallpox free in April, 1977, two years after the last case of smallpox was reported in May, 1975 (Basu, Jezek & Ward 1979:26-27).

### C. Socio-political and moral implications

I wish to bring out two types of implications which bear on issues beyond strictly health or medical concerns. These are of two kinds: 1. socio-political and 2. moral in the Kantian sense of considerations bearing on the long run general good of society or even human kind. Let me first address the socio-political implications of these two knowledge systems.

1. While perusing much of the literature documenting the smallpox eradication campaign one cannot but be struck by its uses of military language to communicate its key concepts. A few examples chosen randomly will illustrate the point: "Intensive Search and Containment;" "a strategy based on the national mobilization of health resources for the main battle against smallpox...the Government of India, the state Governments and WHO...decided to launch an intensified campaign...;" "Operation Smallpox Zero;" "Periodic active search operations;" "villages, localities, mohallas, corporations were routinely searched;" "children in school were one of the main targets," etc (Basu, Jezek & Ward 1979:29, 32, 158). The "campaign" was carried out with support from the police as was discussed in Section B. The eradicators not only made use of military language but of military equipment such as helicopters, walkie-talkies, motor launches, and such (personal communication from James Boyce who witnessed these activities in the early 1970s in Bangladesh).

The disease is the enemy, the absolutely negative which has to be searched and destroyed, that is eradicated. Such a conception in turn rests on a mutually exclusive notion of disease and health where health is defined as the absence of disease. This view can be contrasted to the indigenous Indian (folk and ayurvedic particularly) notion of disease as an imbalance between a variety of factors, none of which should or could be expelled or eradicated. Thus health is not understood as an absence of disease but as a state of harmonious congruence between humors in the body and between these and their corresponding elements in the natural, social

and cosmological environment. There is no element in this system of knowledge which could be absolutely negativized and therefore searched out to be eradicated. Disease is caused by factors within the body and/or between the body and the environment (natural, social and cosmic) which are out of kilter, disharmonious. This contrast between the understanding these two systems of knowledge have of disease explains why to Western observers the existence of a goddess of smallpox who both causes and cures the disease appears utterly paradoxical. Earlier, foreign commentators naïvely dismissed these deities as demons. In the more contemporary scholarly literature this phenomenon has been dealt with by labelling the name of the goddess a "euphemism". By calling the dreaded goddess of smallpox, who sends deadly fevers and pustules, by a name which conjures the opposite, "the cool one", those scholars argue that her worshippers attempt to cajole and flatter her into becoming cool. Such an interpretation misses the point. Śītalā when angry and heated up is the diseased person, quite literally. When pacified and cooled she is the cured patient and the beatific and beautiful woman represented in her iconography. In both her manifestations she is worshipped. A patient suffering from smallpox is addressed as if he or she were the goddess and is worshipped. Treatments in the form of administration of special cooling foods and drinks, of neem leaves, of cooling sandal paste, of reciting and chanting hymns to the goddess and of prostrating oneself in front of the patient are the same actions that constitute the goddess' worship in her temple. Such an understanding of disease prevents a search and destroy response. There is no enemy to be eradicated. Both Greenough and Nicholas in their historical study of smallpox in India point out that the variolators did not pressure those people who refused to be variolated, as certain castes and sects did. Furthermore the work of the indigenous variolators was totally independent of state authority; no police or other state agents were involved. The work of the variolators and the cooperation of the people was a spontaneous expression of grassroot action. The disease calls for efforts to re-establish a lost congruence between various elements. In such a view the disease cannot be objectified as existing separately from a healthy subject. This is why Śītalā is both the disease and the absence of the disease, or the illness and it's cure. The ability to objectify a disease in an epidemic situation is pregnant with serious political consequences. The population at large, harboring in its midst a disease to be eradicated,

becomes objectified as the target. The war is entirely justified since there is a deadly enemy to be destroyed. Resistance to such a war becomes tantamount to treason. Michel Foucault's historical study on The Birth of the Clinic, (1975), has perceptively shown the similarities between the hospital and the prison. In the prison the enemies of society are placed under police surveillance. In the hospital the enemy of health is placed under surveillance. In the field of epidemiology where the enemy is spread out among the population, the police is called upon to second the medical experts in destroying the enemy. The possibilities for abuses of power are wide open and as the earlier quoted eyewitness account of a surprise attack in the middle of the night on the terrified and unwilling peasant family testifies, such abuses have indeed occurred.

In India the strategy to eradicate smallpox shifted from a more directly authoritarian one in the 1950's and 60's to one employing the subtler methods of marketing techniques when WHO joined the venture in the 1970's. The language did not change but the tactics did.

What I wish to emphasize here is that to the dichotomizing between health and disease in the manner discussed above corresponds a socio-political dichotomizing between the target population which is objectified and the agents of the state: medical experts, medical technicians, police (and other state hired experts) who are the subjects in charge of searching and destroying the enemy. A subject/object dichotomy corresponds to the health/disease dichotomy. One side of the equation is passive and acted upon and the other is active and acts upon. This contrasts with the indigenous Indian view of the patient as the goddess incarnate to be worshipped by all including the variolators and other health specialists.

Resistance to vaccination both during the colonial era and after independence is a political act of refusal to be disenfranchized by such a division between legitimately acting subjects and a disempowered population objectified as the target.

In the second part of the paper where a large ritual of state and of healing will be analysed, the socio-political implication of the indigenous system of knowledge will be investigated in much greater depth.

2. The moral issue I am concerned with here is the one bearing on suffering and death and Lifton's theories mentioned in the introduction. The dichotomizing of disease and health into mutually exclusive categories in the scientific medical discourse corresponds to a dichotomizing of death and life. Death is the outcome of unsuccessfully treated disease whereas life, as opposed to death, implies health and vigor. The logic of the scientific medical system makes death the enemy to be conquered as it makes disease the enemy to be destroyed. This does get translated into such practices as keeping terminally ill patients alive beyond their own wishes, the cryonics movement in the U.S. which freezes bodies after death to preserve them until the time when their diseases will have been conquered and they can be thawed back to life, and many other similar practices. Such a mode of thought and action was captured succinctly by someone I heard at a meeting of development experts who said that for him death always represented a failure. Death itself becomes absolutely negativized, the ultimate enemy.

I can do here little more than summarize Lifton's arguments concerning the grave dangers both to the individual and to society of such an attitude towards death. The scientific medical (and developmental) discourse constructs death as the absolutely negative. Such a view corresponds to social conditions in the advanced industrial countries in which the old are no more than unproductive members of society, kept out of sight in old folks homes. The old uncomfortably remind the productive members of approaching death, hence the efforts to keep them invisible. The visible productive members of society forever strive to look youthful and sexy. Lifton's argument, backed by psychiatric case studies and anthropological evidence, goes far beyond the usual moral condemnation of putting away the old. He shows both a social and a psychological link between death denial or death avoidance and violence. His evidence is both voluminous and convincing and I can do little more than refer the reader to his work. It appears that the fear, pain and anger in the face of death badly or only partially experienced and faced, gets displaced into aggressive behavior

targetted at enemies which psychologically are made to bear the taint of death. The pain, fear and anger at death is projected onto the outside, upon an enemy to be ruthlessly hounded out and destroyed. If disease can be targetted for destruction, death also can be targetted for destruction.

In a system of knowledge where disease cannot be so isolated, objectified and targetted, death also is constructed very differently as indeed it is in Hindu India, to stick only to the case at hand. For a more detailed exploration of the place of death in that system of knowledge, I will use the ritual of state discussed in the second part of the paper. This yearly ritual is also a smallpox healing ritual but every twelve year it becomes a death ritual. Disease and death are here used - a better word would perhaps be 'recycled' - to achieve the regeneration of self, community and cosmos. A communal immersion in disease and death becomes precisely the key to renewal. This corresponds exactly to Lifton's claims, namely that full confrontation and integration of death both psychologically for the individual and communally for the society produces an increase in vitality and well being.

## PART II - THE EFFICACY OF RITUAL

Before launching into a discussion of the ritual it will be necessary to briefly state the fundamental principles of the system of thought implicit in such symbolic action. What is highlighted in the following section is the continuity between agricultural processes, bodily processes and socio-political processes. The person is integral to a natural environment and to a social environment. The individual is not viewed - as in the West - pitted against nature in an effort to conquer and dominate it, nor in opposition to society. In this system of thought, the person's very being derives from its integration into nature, society, and cosmos.

### A: The Land, the Body and the Body Politic

In Orissa, smallpox, along with many other diseases, is referred to most colloquially and most often simply as "mother" or as thākuraṇī, i.e., "lady" or "goddess." As such, every village or more generally every territory's goddess is a variant of Śītalā who herself is a variant of Durgā or Kālī, the Great Goddess. As the village mother, she is the particular earth within that village or territory's boundary. The following description by Egnor of Mariamman, the Tamil goddess of smallpox, could apply precisely to the Orissan thākuraṇīs:

Mariamman "took her birth in earth" (...); she is represented as the head of a woman lying on the ground - or rising from it - and her statue, in the earthen huts which are most of her temples, is of earth. People are born in earth; the home land is "the earth I was born of" (...). "Every child is a good child in his birth from earth." (1978:162-163)

Those born on the same portion of earth, the same village territory share the same mother, namely, the village goddess. As her children they are all one and form a kin-like community. The village goddess, that is the goddess of that particular piece of earth, is yearly propitiated by the entire community. She is propitiated to avoid misfortune from occurring to her children, namely, to the community; these misfortunes are mostly crop failures and epidemics. In South Western Bengal this village goddess propitiated by the community as a whole is Śītalā (Nicholas:1982). In the plains region of Orissa the village goddess has different names, often

names related to the name of the locality, but she is everywhere referred to simply as thākuraṇī. In the South Western region of Sri Lanka discussed by Obeyesekere, she is called Pattini. In South India similarly the village goddess whether she is Mariamman or known by a local name, is worshipped by the community for the avoidance of misfortune (Brubaker:1978). The very failure to propitiate the local goddess causes her anger, which gives rise to an excess of heat which may cause both drought and illness (Obeyesekere 1984:42). To propitiate the local goddess, the whole community shares the economic and organizational burden of the festival. Whatever factionalism and conflict may be dividing the community must be at least temporarily forgotten so that every segment of the community may cooperate with every other.

The annual festival of the local goddess requires the cooperation of all segments of the village community, since no one can be omitted, from the humblest untouchable sweepers and carrion removers, to the wealthiest landowner, including the local brahmin(s). As in the organization of the daily ritual in the central cult of Jagannātha, the sovereign deity of Orissa, no link however small and humble in the vast chain of tasks necessary to carry out the worship may be omitted. Everyone has an equally valid share in the ritual. The same is true of the village goddess festival. The model can be extended to include the whole kingdom, along with the feudatory principalities: in sharing in the ritual task of worshipping the village goddess, mistress of the local territory, or of Jagannātha, sovereign of the whole territory of Orissa, the people pool their resources and cooperate as equals in this task (Rösel 1980:89). The ritual requires social cooperation, which amounts to social congruence. The most frequent reason for postponing by a year or more the celebration of the village goddess festival is factionalism, and conflict in general, in the local community (Nicholas:1982). Thus the failure to propitiate the goddess is a political failure. The anger of the goddess arises from anger and conflict in the community which cannot put its fighting aside for the purpose of cooperating in the village festival. The goddess is the earth of the community and when the various parts of her body are at war with each other, are out of congruence with each other, disease, that is - misfortunes due to lack of congruence - is the outcome. Regularly worshipping the village goddess or the territorial sovereign assures that

conflict will not be left to grow indefinitely unchecked, to erupt into a major conflagration. Every year some measure of political congruence is necessary in order to carry out the territory's yearly festival and assure the coolness of the goddess and the welfare of the community.

The relationship between agricultural activities, bodily processes and political processes is one of continuity. All these processes of draining, irrigating and working the land, feeding and draining the body, sustaining and ordering the body politic are seen as being of the same kind and continuous with one another. As Zimmermann has put it Ayurveda (medicine) and Arthaśāstra (the science of political management), are one and the same discourse split into two different branches of knowledge (1978:101). Using the specific example of the temple of Jagannātha in Puri and its monumental yearly festival (Ratha Jātrā) I will attempt to understand how and why healing and politics are indeed part of the same discourse. Ratha Jātrā is a likely candidate for this exercise since it is at once a major state ritual -- reminiscent of those in 19th century Bali which Geertz has called "the theatre state" (Geertz:1980) --in which all representative segments of the Orissan polity participate, and a smallpox healing ritual. The ritual process centers on the illness, treatment and recovery of the three deities in the temple of Jagannātha (see Apffel-Marglin 1985, ch 9). A good place to begin are the paradigmatic notions of the identity between the draining of the body and the putting into cultivation of lands (Zimmermann 1982:9). The two are involved in the parallel and similar activities of irrigation/nutrition and of drainage/depletion of land/body (Ibid.:242). The agricultural metaphor, in Zimmermann's terms, has a central place in Ayurveda.

The continuity between agricultural activity, bodily processes and socio-political processes in this system of knowledge is briefly described in what follows. The description is in the form of an ideal-typical traditional Hindu Kingdom. This description is not a historical reconstruction but the description of an ideal type used for the purposes of clarifying certain principles of a system of knowledge. An actual historical description of any given Hindu Kingdom would be very different indeed.

Converting uncultivable land into cultivable land is the task of the king. According to Orissan inscriptions the ideal king conquers a kingdom, builds a temple and later reservoirs to irrigate the land. Then he proceeds to gift these territories now valuable because of drainage and irrigation to the deity of the temple and to the Brahmins. The ideal kingdom is illuminated by the sacrificial fires of Brahmins, full of temples reaching toward the heavens in whose lands reservoirs guarantee plentiful harvests, with a king who generously gifts land to the Brahmins (Rösel 1980:99). But agriculture is more than a metaphor since "food is the root of all living beings..." (Sūśrútra Samhita I, 28 in Zimmermann 1982:221); food is the fount of all human activities (Ibid.:224, also Khare, 1976). The chain of being in the universe is the production and consumption of food through repeated transformative processing from the cooking in the earth by the sun and by water to the kitchen fires and cooking water. But all kitchen fires are also sacrificial fires and all food is first offered to the deities. The food will be truly nourishing and sustaining of health, well-being and happiness only through the blessings of the gods. These blessings can be obtained by making offerings to the gods. The gods, being sustained through human food offerings, in return shower blessings on humans. In temple ritual these blessings of the gods are received concretely through the ingestion of consecrated food: *mahāprasāda*. This food has first been offered to the deities by temple brahmin priests and been consumed through the fragrance reaching the deities. After this ritual food offering, the food becomes the leftover of the deities capable of sustaining and blessing humans. In Rösel's words we can say that "this divine kingdom maintained itself with the help of a sacred food-chain, [...] it recycled divine pleasure. It was along this matrix of nectar-feeding lands, service, pleasure [*bhoga*, also meaning 'food'] and grace that the God and his palace town increased and decreased..." (Rösel, ms:17). The expression "nectar-feeding lands" is applied to lands donated to the temple or to sectarian monasteries for the specific purpose of providing food for the temple kitchen in the form principally of rice (the staple), coconuts and sugar cane.

The ecological language of recycling seems particularly felicitous. The foodchain forms a complete cycle in which the deities play a linch-pin role. From the earth rises the sap into the plants, harvested and variously

processed by humans who offer it to the gods who inhale the food's fragrance. At this end point of a continuously ascending and progressively refining process from the earth to the heavens, the food returns and begins a downward path as the left-over of the gods, eaten by humans, who are sustained and whose bodies drain themselves of the impure left-overs -- the non-incorporated or non-used parts of the food, i.e., feces, urine, sweat -- which returns to the earth (see Egnor 1978:50; Daniel 1984:85).

This chain of life necessitates for its implementation, a certain type of socio-political organization: a king to conquer 'virgin' lands and to drain and/or irrigate them and thereby make them cultivable. Some of these lands must then be gifted to Brahmins who alone can 'establish' (pratiṣṭhā) a deity and install it in a temple (Apffel-Marglin, 1985:135). These gifts of land by Orissan kings to high status Brahmins imported from Kanauj in North India established the category of śāsan brahmins and śāsan villages. They are indispensable in the chain of being that we are discussing because their vedic knowledge and pure manner of living entitles them alone to establish temples and deities to dwell in them. These śāsan lands enable the high brahmins to sustain themselves. The king must also give some of this newly cultivable land to the temples to provide the food for the gods. The temples must be staffed by temple servants, some brahmins and some non-brahmins who will carry out the tasks involved in preparing the offerings for the deities, the most important one being food. The cooking must be done by brahmins who are of a lesser status than the śāsan brahmins since they are involved in service (sebā), be it service of the deity. Besides brahmin cooks there will also be need of various other castes such as artisan castes necessary to the cooking process like potters, cowherds, and many others, as well as cultivators. These temple brahmins cook and offer the food to the gods, who inhale the cooked food's fragrance. What the gods do not use, namely, their leftover food, is then distributed to all those who serve in the temple and nourishes them as well as convey the gods' blessings to them. It can also be purchased by pilgrims visiting the temple and nourish and bless them.

The king is an earthly incarnation of the divinity, Jagannātha; for this deity is the real sovereign of Orissa. Whatever sovereignty an earthly king possesses can only come from the divinity. This divine sovereignty is

established in the king by the śāsan brahmins at the time of his coronation. The king is also a temple servant; the first among all temple servants. His relationship to the sovereign divinity is one of service and he carries out certain types of ritual service in the temple, the most important of these being at the time of the yearly festival of state when his position of humble servant of the divinity is displayed to the thronged population who have come to participate in it (Apffel-Marglin 1985). This idealised and simplified political and social implementation of the chain of life leaves out many things of course,<sup>6</sup> but it serves the purpose of clarifying the structure of a particular system of knowledge.

The maintenance of this chain of life necessitates the whole spectrum of Hindu society; the warriors whom the king needs to conquer and then protect the land; the two main classes of brahmins and all the other castes necessary to agricultural production, food processing, the disposal of bodily wastes, the construction of temples and human housing, etc. The deities enable the ascending chain of food to begin its return journey to sustain human life. They stand at the apex and the turning point. Since the gods will only accept pure food cooked by pure hands, temple brahmins are indispensable. Vedic brahmins of course can be said to be the most indispensable of all since without their knowledge of the powerful words the deities could not be fed in the first place since they would not dwell among humans. The king by his conquering and agricultural development activities makes it possible to begin the chain of life and once begun and ongoing, to protect it. But he is an enabler among others. As a warrior and a hunter (a royal prerogative) who sheds blood - an impure activity - he is disqualified from being able to offer food to the gods. His very sovereignty is acquired through the powerful words of the vedic brahmins. He is totally dependent on the two classes of brahmins as they are on him since without him they would have no land and therefore could not sustain themselves.

## **B: A system of thought in practice**

For this particular cultural construction to have any reality, or in other words for it to become a lived experience, necessitates the existence of a particular social and political organization. Let me attempt to sketch

in an ideal-typical way what these socio-political requirements are. The existence of deities who require offerings of pure cooked food as a necessity for human beings to be nourished means that one cannot sustain oneself merely by one's own efforts and feed oneself directly. One needs different types of brahmins, the brahmins need different types of castes to carry out those activities which would pollute them and therefore render them unable to establish and feed the gods. Everyone needs to be protected; the protector because of his activities is also unable to feed the gods himself, and therefore to sustain himself. In other words, this cultural construction demands a social and political order in which everyone is interdependent; everyone needs everyone else because of the deities and their particular requirements. Each function is necessary to maintain the chain of life. This is best seen in the organization of a large temple like that of Jagannātha in Puri where there are 108 different functions carried out by some 7,500 temple servants (Rösel 1980:4-7, 71). In the carrying out of the elaborate daily ritual which consists of the bodily requirements and pleasure of the deities - food, bathing, clothing, fragrances, cooling, singing, dancing, sleeping, and others - the omission of one single link in the vast chain of actions either grinds the whole operation to a halt (Apffel-Marglin 1985:94) or renders it invalid. Each function, however humble, is absolutely necessary.

There is a functional equality between the various services rendered in the temple; this equality is given by the deities who create the services in the first place by their bodily requirements (Rösel 1980:87). This functional equality between all the varied services rendered to the deities does not mean that they are all equally esteemed or prestigious, only that they are all equally necessary. Those who can come closest to the deities are much more esteemed than those who are low on the return path of the chain of life, closest to its end point, the earth as the receiver of life's left-overs, which of course is also its beginning.

The number 108 is a magical one and has grown from the original 4 in the 8 centuries of the temple's existence. Each named service can be carried out by several persons. The number of persons the temple could support was, before the advent of a cash economy, totally dependent on the amount of land possessed by the temple or gifted to other institutions

specifically for the purpose of offering food in the temple. All persons carrying out some service in the temple were fed by the temple. Access to temple service was achieved through heredity. In the case of the creation of new services, or the addition of persons entitled to perform an already staffed service, access was through competitive and conflictual maneuvering. Rights to perform certain services can be bought and sold among temple servants. It is important to realize that the various services do not correspond necessarily and even typically with caste divisions. Three-fourths of all temple priests are brahmins and they share among themselves the great majority of services (see Appfel-Marglin 1985:46). Judicious marriages are another way of gaining access. Rosel summarizes his description of the jostling and competitive behavior by saying that it amounted to an ordered disorder (Rosel 1980:80), the disorder being kept in bounds by the absolute necessity of cooperation. Order is maintained mostly in a decentralized manner since each service group has at its head a "general" (bishoi) in charge of law and order within its own group. There was a person responsible for the overall smooth running of temple activities, the parikshā, a sāsan brahmin. But he mostly delegated his powers among several temple servants (Ibid.:81). The temple both grew and functioned in a decentralized and somewhat anarchic manner.

New services or new entitlement to existing services were carefully recorded by temple brahmins in special documents since each service consisted of the privilege of receiving support from tax free temple lands (these privileges are called mahal). The role of the king as first servant of the deity was not one of being able to create or even allot these privileges but only of confirming them through royal official recognition. This is how Rosel describes the situation:

This process of differentiation was at the same time one of diversification. It was not the evolution of a deliberately devised, efficient system of division of labor; instead the present diversification represents more the outcome of eight centuries of mutual alliances, intrigues and suspicion of different, often antagonistic priest groups, eager to intrude into new services and jealously guarding their own against the interference of others. Normally an already internally accomplished system of division of labor was reconfirmed by a king, through the official recognition and installation of a new service, with the subsequent allotment of new shares of holy food and clothes (Rosel ms:6-7).

The king's official recognition came in the form of the granting of titles and was publicly displayed in the ritual of "tying the sari," that is, tying a piece of the deity's clothing onto the head of the honored persons. The king could grant such honors (maryādā) not only to temple servants but to members of the many monasteries in Puri<sup>7</sup> as well as to feudatory rajas.<sup>8</sup> These honors entitled their receivers to carry out some service in the temple or during certain festivals and to the display of certain paraphernalia symbolizing their honorific status. Clearly the king had greater maneuverability and could act in more than simply a rubber stamp fashion.

Furthermore and very importantly, these honors conveyed upon their recipient some portion of the divine sovereignty. This, was expressed in the tying of the cloth of the deity onto the recipient's head. Thus even though the king of Puri is called the "moving Vishnu" (calanti viṣṇu), he is only the first among others and sovereignty is not an exclusive royal monopoly. The king is also only a link in the chain of life even though he is a very important link. In fact, all those living in the kingdom were part of the chain of life but some were recognized through the receiving of royal temple honors as more important than others. Of course there was competition and conflict over the conferring of these privileges, but in managing these conflicts when they erupted beyond the capacity of groups to arbitrate them themselves, the king's actions

"were not legislative, insofar as they were always addressed to specific groups and individuals, were not of general applicability, were subject to alteration or repeal according to current needs of kingship, and could not fix the law or even strictly serve as an illustration. Furthermore, the administrative actions of the Hindu king in respect to the South Indian temple were context sensitive and context bound in an organizational sense as well. Thus, there does not appear to have been at any time a single, centralized, permanent bureaucratic organization (on the Weberian model). Instead, there was a temporary affiliation of a number of local groups, constituted by, or in the name of, the king and empowered to make public decisions on specific matters (Appadurai 1981:214-215).

As Appadurai's careful historical study of a South Indian temple shows, this organic state of affairs was fragmented during colonial rule. For example, the competition between two sectarian groups for control of temple affairs was legislated by the British into two mutually exclusive groups,

the winner being the Tengalai sect, the loser the Vatakalai sect, the latter being legislated forever out of involvement in this particular temple. This legislative action bases itself on universally valid, non context-sensitive, rules. These findings of Appadurai in the context of a South Indian temple seem to fit perfectly with the historical study of the Jagannātha temple done by Rösel.

What is, for the purposes of the present argument, essential to note is that the structure of authority in the temple and beyond the temple, in the kingdom, was not a pyramidal, centralized one. Everyone's position was determined and recognized in terms of one's relationship or rather service to the deities. The deities are the only source of absolute authority. The fiction of a deity who is the actual owner of the land, who requires to be fed pure food, and who is the fount of all authority and all blessings, enables the existence of a very real, non pyramidal, multi-centric socio-political landscape. In fact, the distinction between fictional and real is less than useful in this context. At one empirical, positivist level, such a deity is a fiction; at another level, that of lived experience and human social and political life, it is very much real in the sense that without it, the whole tangible edifice of the way people act would collapse.

In the great chain of life as exemplified in the functioning of a great temple such as that of Jagannātha, disruption, conflict or disorder is what disrupts the vast cooperative task of worship. If any one group or person in the many services all equally required for the ritual to proceed is out of phase, the whole process stops or becomes invalid. Similarly in medicine, "sickness is a kind of being-out-of-phase, and medicine an art of good conjunction" (Zimmermann 1980:100), an art of restoring congruence between various elements of the body, the environment, and time, that is an art exquisitely and exclusively context sensitive. The king, like the physician, must restore good conjunction between all the elements of the kingdom so that the chain of life may continue, an activity which has to be by necessity context sensitive and is the royal activity of "protection."

### C: The body and the body-politic in ritual

Let us shift our focus to the vast ritual of state enacted yearly in Puri in which the king's ritual action has both medical and political meaning. Furthermore, the whole festival is a political event, the very demonstration of political health and vigor in its ability to smoothly (if it is successful) orchestrate the cooperation of all temple servants, monasteries, other representatives of the society at large such as cultivators, as well as in the pre-independence days the heads of the various tributary minor kingdoms, and since independence various representative members of the state government. This monumental endeavor requires enormous pooling of both economic and organizational resources. It is also the occasion when the current configuration of honors and privileges is publicly displayed. Although I have previously described in detail the sequence of this festival and how its processual structure is organized around the illness, treatment, and recovery of the deities (Apffel-Marglin 1985) it is only since then, while conducting field research on traditional methods of dealing with smallpox, that I gathered enough information to make it clear that the deities' illness was specifically smallpox. The fact that this realization did not surface during my previous field work when smallpox was not of primary concern to me, probably indicates that with the progressive decline and final disappearance of this disease from the region, this part of the significance which the ritual had has receded from people's awareness. However, it may also be a function of my lack of sensitivity or of not asking the right kinds of questions. It is hard to know which.

In any case Śītalā plays a key role in this festival and is popularly credited with making the deities' ill. Perhaps it is the case that everyone implicitly knows that the disease Śītalā sends is smallpox, although Śītalā is the goddess of other poxes and infectious diseases such as chicken pox, measles, rashes, cholera, plague, gastroenteritis, diarrhea, and typhoid.<sup>9</sup> The treatment the deities are given after they have been drenched by the water from Śītalā's well in the outer compound of the main temple parallels the treatment given to a sufferer of smallpox at home. The kitchen fires in the temple are extinguished; only cold foods are offered to the deities; no strangers are allowed in the temple which is closed to pilgrims during the

fourth night of illness. No singing and dancing takes place and no shouting or quarrelling should be heard.

During a person's illness with smallpox the following is done in the house: no frying, no hot food, no singing, no shouting, worshipping daily Sitala in her temple and generally being gentle and compliant with the wishes of the patient who is addressed as Mā and those of goddess Śitalā as tradition knows them. Confrontation, aggression, as well as too great joy and celebration are both avoided; extremes are avoided and gentleness is emphasized. Not doing all these things would offend the goddess and bring on her anger in the form of an intensification of the disease. No strangers -- non family members -- are allowed in the sick room. All food -- only boiled, non seasoned, non fried foods are consumed along with cooling drinks such as green coconut water and sweet milk with banana -- is first offered to the sick person and then consumed by family members, as would be done in the worship of a deity.

On the last day of the fortnight of illness the deities have recovered and the public can enter and see them. This is called the "viewing of the new youth." Two days later the deities are carried in great pomp outside the temple and placed each on one of the three huge wooden chariots (ratha) specially prepared for the occasion. The king emerges then from his palace a few yards across from the temple, carried in a chair, surrounded by his śāsan brahmin preceptors, ex-feudatory rajas and some male agnates. He ascends the temporary ramp of each of the chariots in turn and proceeds to first sweep the platform around the deity, circumambulating it, using a gold handled broom, then repeating his steps and sprinkling water fragrant with sandal paste from a pot and lastly he does a third circumambulation sprinkling powdered sandalwood. This ritual, referred to as the "sweeping ritual" is one of the dramatic highlights of the festival.

The chariots are then, one after another, pulled by the mass of pilgrims and dragged to the northeast some 2-1/2 kilometers away to a temple called Guṇḍicā where they will reside for 7 days. The whole process from the end of the king's sweeping to the end of the deities' temporary stay in Guṇḍicā's temple takes 9 days and the period is referred to as the "nine days festival" and on the 10th day the deities are replaced on the

chariots. The king repeats his sweeping ritual and the chariots are pulled back to the main temple. This is called the "return festival" (bahudā jātrā). By the 11th day the deities are returned inside the main temple.

Focusing on Śītalā, I became aware that the king's action of sweeping and sprinkling, besides making him an untouchable sweeper (a fact much foregrounded and discussed by informants), were also the actions which goddess Śītalā is said to carry out when she wipes away the disease. The most commonly found iconography of Śītalā shows her sitting on a donkey, holding in one hand a broom and in the other a pot full of water. On her head she carries a basket or a winnowing fan full of pulses.<sup>10</sup> When she shakes her head in anger, she spreads the pulses and gives the disease. When she sprinkles cool water from her pot and sweeps the scattered grain away, she removes the disease. The king's action, punctuating the movements of the deities to and from the temple of Guṇḍicā, parallels exactly the goddess' healing actions.

The temple of Guṇḍicā is empty for the rest of the year, having no installed deity. The name Guṇḍicā is that of the wife of the legendary founding king of Jagannātha temple. However, one of the more obscure meanings of the word guṇḍi is "pox" in Oriya, even though this is not a currently used word. According to Nicholas (personal communication) the Bengali Guṭikā becomes the Oriya Guṇḍicā. Guṭikā is another Sanskrit word for smallpox and is the name of the smallpox goddess mentioned in 1767 by Holwell. The identification of Guṇḍicā with smallpox became confirmed to me since by informants.

Two informants talked about the disease as the "nine days festival" and called the 10th day "the return festival" when the goddess departs, i.e., the patient recovers. This terminology is the very same one used to refer to the journey, stay, and return of the deities to and from the Guṇḍicā temple. It now seems to me that the peculiarity of visiting an empty temple may express the fact that the goddess visits in people (i.e., they suffer from smallpox) and then returns where she usually dwells, leaving them empty of the goddess, i.e., recovered. The deities visiting temporarily in Guṇḍicā temple may signify the fact that they have removed the disease away from the main temple and left it in Guṇḍicā's temple.

I would like now to shift attention to the political meaning of the king's sweeping ritual. As people often repeated to me the king displays here his relationship to the deities; he is to them as the humblest of servants; an untouchable sweeper (hādi). Even though he is hailed as he emerges from the palace by shouts of "Victory to the Mobile Vishnu!" his divinity is a partial emanation from the ultimate sovereign, Jagannātha. In performing services for Jagannātha other persons can share in this divine sovereignty; speaking of the situation in the late 17th and the first half of the 18th century, Kulke describes one instance of this "sharing": "The Rajas...tried to gain and to assure the support of their feudatory rajas (...) by "sharing" their own position in the state cult with them," (Kulke 1978:339) and granting honors and privileges to these feudatory rajas such as having a big drum beaten for them (a symbol of sovereignty) during their visit to Puri on the occasion of the great festival (Ibid.:342).

Being the sweeper of the divinities expresses at once the king's absolute subordination to the deities, his relationship of service to them, and also the fact that he is not the ultimate, absolute source of sovereignty. He performs a service for them and shares this activity with many other persons. The King is called Jagannātha's fist servant (adyā sebāka); as a servant is he one among many. The king is the foremost among several other "mobilizing actors" to use Appadurai's term:

Authority is the capacity to mobilize collective ritual deference to a sovereign deity in such a way that the mobilizing actor partakes of divine authority in relation to those human beings who are either the instruments or beneficiaries of such worship. More simply still, authority is the capacity to command collectivities in the homage of the deity. Of course, given the sociological complexities of the ritual process and the incomplete jural capacities of the deity (...), such authority can never be monopolized by any one individual or group and must always be shared (Appadurai 1981:226; my emphasis).

What links together the medical and the political meaning of the king's sweeping ritual is that the king, as the physician of the body politic, is part of what I would like to call an "ecological socio-political system" where congruence, mutual adjustments, and context sensitivity are the order of the day, as they are in medicine. Another way of putting this is to say that the inability to monopolize authority means that political authority

is shared and diffused among many persons and groups. Congruence is brought about by mutual adjustments through conflict and competition; this congruence is necessitated by the absolute need to cooperate in the service of the gods. Order is not imposed by an external authority through a chain of command working down a pyramidal hierarchical organization. Rather, order is the result of a conflictual competitive process which has to result in cooperation.

The hierarchy in this microcosm of Hindu society which this temple represents is what I would call, following Gomes da Silva (1986), a circular hierarchy. Let me clarify; the group of temple servants who are in charge of the deities during their illness are a low caste group said to be descendants of tribals (the daitās). During this ritual of state, they play a prominent and irreplaceable role. They are the ones who carry the deities in great pomp from the temple to the chariots. Outside of this time, their touch would pollute the deities. During the twelve yearly enlarged version of this festival, when the deities after their illness die and their wooden images are hacked to pieces and buried, it is these low caste servants who observe the funeral taboos and rites. They are considered to be blood-kin of the deities.

Similarly during the yearly festival of the most well known goddess of healing in Orissa (Mangalā), the goddess appears in untouchable men who play the prominent role in her festival, heal the sick and admonish the powerful.

During these times - namely the festival of the chariots in Puri and the goddess festival in villages - those at the apex of the hierarchy, the brahmins, are useless and becomes secondary to untouchables or low caste persons who take charge of things and are in centre stage. The brahmins are totally helpless to heal and therefore to renew the community. The King's actions of sweeping away the disease makes of him an untouchable sweeper, a fact much underscored by all participants. Healing and renewal is in the hands of those low in the hierarchy, those close to the earth on the return path of the chain of life from the deities to the earth. It is in the earth that the impure left overs such as the dead parts shed by the body are recycled into new life. The earth is the transformative matrix with the

power to regenerate. The social hierarchy corresponds to the chain of life discussed above. Those closer to the deities on the upward ascending journey from the earth to the heavens are more esteemed and higher; those on the downward, return path of the deities' left-over are less esteemed and lower; they are the ones, however, who sustain, renew and recreate life. The hierarchy is circular for at nodal points, the lowest become the highest.

In a pyramidal hierarchy, the organizational form of rational modern bureaucracies, the chain of authority is unidirectional from the top to the bottom, and the separation between those in authority and those upon whom authority is exercised is absolute. The ethos is not ecological, the intent not on regeneration. The ethos is one of control and domination - of nature, of disease, of people; the intent is one of conquest and mastery.

In this Orissan ritual we are faced with a reality in which agricultural, medical and political processes are seen as being of a kind. The political process consists of a balancing or a harmonizing between various parts of the society. The bodily processes also consist of a harmonizing between hot and cold intakes which consists of a harmonizing with the land and its products as well as with the seasons. The variations in heat and cold during the seasons dictate the appropriate countervailing diet in terms of hot and cold in order to balance these two poles. The land, the body, and the body politic are all part of a single great chain of life.

In modern medical epidemic control as exemplified in the smallpox eradication campaign of the World Health Organization and the Government of India in the 1970s, the disease was viewed as the enemy which had to be searched and destroyed. Disease and ultimately death itself are to be conquered. Such an attitude cannot be shared by traditional Oriyans for whom disease and death are recycled into renewed life.

This alternative view of relating disease and health or life and death is very similar to the vision detailed by Ashis Nandy in his book The Intimate Enemy (1984) in which the self and the anti-self are part of each other. He contrasts this indigenous Indian view to that of the Nazis who create an anti-self which they proceed to totally externalize and then exterminate.

### PART III - AIDS AND THE ERADICATION OF SMALLPOX

The evidence that I was so far able to gather is based on a clinical report by Dr. Robert Redfield et al of Walter Reed Army Hospital in Washington D.C. (1987) and the reports by the Times of London science editor, Pearce Wright (May 11, 1987), on the correlation made by epidemiologists of such evidence with the history and geographical spread of the smallpox eradication programme.

Redfield et al report that "primary smallpox immunization of persons with subclinical HIV disease poses a risk of vaccine-induced disease, and that multiple immunizations may accelerate the progression of HIV disease." (Ibid:673). The case described is that of a 19 year old black recruit who began basic training at a military base in April 1984. He had been healthy throughout high school, taking part in competitive athletics without difficulty. The results of a complete physical examination including a complete blood count were reported to be within normal limits. Two and a half weeks after the smallpox vaccination the recruit fell ill with fever, headache, neck stiffness and night sweats. He was diagnosed as having developed AIDS. Interviews by trained investigators with the patient and family members failed to reveal evidence of homosexual activity or intravenous drug use. The patient did admit to multiple heterosexual contacts, including some with prostitutes over the previous five years. He had no history of prior smallpox vaccination nor any scar of such vaccination. The patient died in December 1985.

Dr Robert C. Gallo, who first identified the Aids virus in the US, is quoted as having told the London Times science editor the following:

I have been saying for some years that the use of live vaccines such as that used for smallpox can activate a dormant infection such as HIV.

(Times of London, May 11, 1987:18)

Some epidemiologists seem to be saying that HIV was, previous to the smallpox eradication campaign, a mostly dormant virus confined to certain populations of Central Africa. From a minor endemic illness of that part of the world, HIV was transformed by the smallpox eradication programme into

the current worldwide epidemic. This theory explains why the Aids virus (HIV) regarded by scientists as weak, slow and vulnerable, began to behave like a virus capable of creating a deadly epidemic.

The smallpox vaccine theory does seem to account for the position of each of the seven Central African States which top the list of countries most affected by the Aids epidemics. Pearce Wright reports that although no detailed figures are available, WHO information indicates that the list of most Aids affected Central African states matches the concentration of vaccinations. The greatest spread of HIV infection matches the most intense immunization programmes. The figures are as follows: Zaire 36,878,000; Zambia 19,060,000; Tanzania 14,972,000; Uganda 11,616,000; Malawai 8,118,000; Ruanda 3,382,000; and Burundi 3,274,000. The hypothesis linking Aids epidemics with smallpox eradication would also provide an explanation of how Aids entered the US.

"About 14,000 Haitians, on United Nations secondment to Central Africa, were covered in the campaign. They began to return home at a time when Haiti had become a popular playground for San Francisco homosexuals. ....Aids was first officially reported from San Francisco in 1981 and it was about two years later before Central African states were implicated. It is now known that these states had become a reservoir of Aids as long ago as the late 1970s. Although detailed figures of Aids cases in Africa are difficult to collect, more than two million carriers and 50,000 deaths, estimated by WHO are concentrated in the countries where the smallpox immunization programme was most intensive." (Wright, Ibid).

The hypothesis linking the smallpox eradication campaign with the Aids epidemics also explains why Brazil became the Latin American country most affected by Aids. Brazil is the only South American country covered in the smallpox eradication campaign.

The link established by some scientists between the smallpox eradication campaign and the Aids epidemics has elicited from WHO a rather defensive response. When I called the organization to try and obtain further information I was told that Pearce Wright's article was a piece of totally irresponsible journalism and his reports false. I was advised to read the press release put out by WHO to that effect. While conversing with a friend who is a much respected member of the US Aids researchers

community, I learned that WHO's response was more politically motivated than a reasoned response. He also told me that Robert Redfield is a much respected researcher and his findings incontrovertible. It is, however, a measure of the intensity of the debate these findings have aroused and of their politically sensitive nature, that no reports of this link has yet appeared in the US press (as of this writing, July 1987).

Clearly, it will be a while till all the scientific evidence is in and the dust settles. No definitive conclusions can be drawn now. However, these latest reports do alert us that something is amiss. What I wish to point out is the similarity between this hypothesis concerning the cause of the Aids epidemics and other phenomena in a different scientific field, that of chemistry and its commercial uses in the form of pesticides and drugs. Pesticides are scientifically developed to eradicate various pests and weeds. At first the successes are striking; agricultural production increases dramatically. The long run effects, however, reveal the danger of these products. They trigger a response by nature which produces pesticide - resistant insects and plants. A well-known example is the eradication with DDT of the malaria carrying mosquito in much of Asia. This has produced a deadlier form of malaria-carrying mosquito which is resistant to DDT and inflicts a meningital form of malaria. In the field of drugs, another example is that of penicillin cited by Nandy and Visvanathan in this volume where its efficacy has plummeted from the high 90% to below 10%. Besides these consequences, pesticides have had and continue to have a very destructive impact both on the environment and on human health. More and more such products are banned even though many items banned in the developed world find their way with deadly results in the developing world (Weir and Shapiro:1981).

All of this is perhaps not conclusive evidence of the fundamentally flawed nature of the scientific system of knowledge but it should prod us into critically reappraising a mode of thought which externalizes the source of suffering and death and seeks to eradicate it. It is a radically non-ecological mode of thought with consequences in the domain of politics, social integration, morality and in its own domain of technical efficacy.

## CONCLUSION

Let me attempt in this concluding section to extract from this study those lessons which might be relevant to development issues in general and issues of technological transfers in particular.

Let us first briefly assess the issue of the so-called unchangingness of tradition. Variolation could have been discovered in several places more or less simultaneously, such as China, India and the Arab countries. The historical record available would seem to point to the fact that this knowledge and attendant techniques were probably brought to India from the Arabs. The earliest mention of variolation in India, dates from the first quarter of the 18th century. At the turn of the 17th and 18th century a British physician reported from Aleppo in the middle east the practice which an elderly informant communicated to him saying it was already practiced in her parents' generation. This would indicate that variolation, called "buying the smallpox", was practiced in the middle east by the first quarter of the 17th century. Of course such spotty historical evidence cannot be conclusive but it does indicate the likely possibility that variolation may not have been an indigenous Indian invention but borrowed from the Arabs. It certainly did not seem to be known in India in the 16th century since it is not mentioned as part of a therapeutics for smallpox in medical texts of that time.

In any case whether variolation was a form of knowledge and technique indigenously developed or borrowed from others, it was readily accepted in India and incorporated into the already existing system of worship of Sitalā and of dietetic treatment. A clear-cut example that traditional systems of thought and action are not closed and are open to innovations, whether brought from the outside or indigenously developed. Variolation was a spectacularly more effective method for controlling smallpox than dietetic treatments and the people accepted it readily. What we therefore need to ask is what made another knowledge and technique, that of vaccination, not readily acceptable. Vaccination as a therapeutics is superior to variolation in that vaccinated persons are not contagious and the rate of mortality is much lower, about 1 in a 1000, than with variolation. There are several issues to be examined. First of all the

superiority of vaccination over variolation may not have been great, if it existed at all, during the time both techniques overlapped in India, namely from 1803 when vaccination was brought to India from England to 1865 when variolation was outlawed. In fact it is not clear that objectively speaking vaccination was in the 19th century in India more effective than variolation; the vaccine brought from England did not fare well in the tropical heat and effective methods of refrigeration were unavailable. In the early 1960s, Dr. Gelfand who did an evaluation of the government of India vaccination program concluded that due to "incomplete coverage of the population and the relative ineffectiveness of liquid lymph vaccine in a warm climate, the disease retained its high endemicity and its tendency to recur periodically in epidemic fashion" (Gelfand, 1966:1635). This must have been even truer of the early 1800's. In contrast to the poor performance of liquid lymph vaccine, indigenous variolation in the 19th century was extremely efficacious.

Given the opinion of the British physician Buchanan-Hamilton concerning the effectiveness of variolation in Bengal in 1812 and the little importance of introducing vaccination there as well as the dismal record of the Indian government vaccination campaign in the 1950s and 60s - a campaign which did not even come close to the 81% coverage found to exist in the eastern provinces in 1850 by surveys done by British physicians - it is not clear at all that vaccination was indeed a superior form of smallpox control. But for the sake of the argument let us even assume that it was a superior form of technique. The superiority, however, could not at all be of the same magnitude as that of variolation over dietetic treatment. Given the effectiveness of variolation when practiced widely among the population as it was in 1850, the superiority of vaccination in India was more of a theoretical nature than a tried and tested one. In any case what differentiated the two methods apart from their perceived or real respective efficacy, was two factors:

1. vaccination was brought by the alien rulers and after 1865 was imposed in many parts of India by them. After independence it was a measure brought to the people from above by government experts and administrators.

2. vaccination was never integrated into the people's modes of thought and action (with the stray exception of Foster reporting having seen a variolation needle on an altar of Śitalā in Bangladesh in 1974). Quite the contrary; overwhelmingly - if not always - vaccination was brought to the people by persons not only convinced of the superiority of scientific medical science over indigenous healing practices but by persons regarding the people's religious practices surrounding healing not as merely inferior but as bad, obscurantist, and superstitious.

Focussing on their relevance in the context of development, let me expand on each of these factors in turn. First of all besides the political advantage of a practice which is not of a top-down nature but which is genuinely grass-root, variolation was also cheap. Economically, there is not the slightest doubt about the clear advantage of variolation over vaccination. WHO's campaign was extremely costly; besides the normal cost of running a very large administrative organization, the cost of developing and purchasing effective methods for preserving the vaccine in tropical climate, there was added the enormous cost of cash rewards given out to persons who gave information on cases of outbreaks of smallpox. In the early years of the campaign, these rewards were relatively low, 10 to 15 rupees for information, but towards the end of the campaign they climbed steeply into the four digit figures although there were of course many fewer cases to be reported. The cost of the campaign was to be reckoned in the 10's of millions of dollars. There is, however, little need to emphasize the advantages of low cost technology over high cost ones or the advantages of bottom-up practices over top-down ones. These are well-known and most development literature nowadays emphasize the desirability of such economic and political attitudes. We have nothing very new to learn from this study on this count.

We have, I believe, a great deal to learn from the second factor, the cultural one. One such lesson is fairly obvious. A technology or practice which is introduced with no efforts at enlisting the active support of the population will be rejected as the vaccination campaign of the 50's and 60's was. In the 1970's WHO not only used cash rewards but had an extensive campaign of educating the population about the effectiveness of vaccination in stopping smallpox epidemics as well as a programme for training

community members to be vaccinators or to assist the government vaccinators. Enlisting the trust and cooperation of the population by these methods was the one factor which Dr. Foster singled out as most responsible for the success of the WHO programme. I would like to add to this the fact that government and WHO technicians and experts received sensitivity training and refrained from using insulting or arrogant expressions toward the people's beliefs in Śītalā. However, we must remember that since the end of the 19th century there was no alternative to vaccination. Variolation as a technology and an indigenous grass-root organization has disappeared irretrievably. The variolators did not pass on their calling to their sons after the practice was outlawed. Thus in the 20th century one is hard put to come up with a cheaper and more grass-root alternative to that used by WHO. The lessons to be learned from the case of smallpox can, however, be applied to other cases in the field of health where indigenous methods may not yet have disappeared. Such a case could be that of the knowledge and practices surrounding birth control. In my field work experience in eastern India, I have learned of several indigenous methods which, as of 1981 when I last enquired, were not being researched by WHO in India.

The lessons which perhaps can be generalized from this study to other cases is that the superiority of the scientific medical system of knowledge over other systems which do not separate naturalistic from religious discourses cannot be taken as an a priori. Efficacious, grass-root and cheap techniques of healing do not require such a separation. The perceived superiority of the scientific system stems from its hegemonic character. The separation of rationality and the pursuit of truth from religion may have been a necessity in the West where a hierarchically organized church had the power to legislate what was to be considered truth and what falsehood, and the power to punish those found to be in error. In India there is no corresponding ecclesiastic centralized pyramidal hierarchy, no cannon, no dogma, no powers to legislate truth and falsehood. On the contrary there is a long tradition of seeing truth as many-sided and approaches to it as many-pathed. The variolators were low status people. Their practices were not opposed by brahmins, the custodians of Sanskrit literature. Both high and low castes joined in worshipping Śītalā, accepting each others' techniques and theories. Today in the cult of

Orissan healing goddesses, untouchable healers and brahmin priests join together at her festival. The lesson of this study is not only that one should not accept the prima facie superiority of scientific medicine over other healing traditions but that the scientific medical system may - in spite of many spectacular technical achievements - be fundamentally flawed in respect to its socio-political and moral consequences and perhaps even its physiological consequences. In absolutely negativizing disease, suffering and death, in opposing these to health and life in a mutually exclusive manner, the scientific medical system of knowledge can separate in individuals and in populations what is absolutely bad, the enemy to be eradicated, from what is good, health and life. In the process it can and does objectify people with all the repressive political possibilities that objectification opens. In the process it blocks the possibility of integrating disease, suffering, and death to life and displaces outside the self, community or nation, the rage and anger at suffering and death with catastrophic consequences. These have been investigated and detailed by Lifton and can be as serious as mass violence, genocide and nuclearism.

In the view of such findings it is not sufficient to suspend until further investigation the belief in the prima facie superiority of scientific medicine, but it becomes necessary to appraise such a system critically. It becomes necessary to look at older healing traditions with appropriate methodologies which rescues them from the dust bin of irrationality in order to find less potentially dangerous modes of thought and action.

## FOOTNOTES

1. I put these terms in quotation marks because in a Hindu context the word "supernatural" is a misnomer as I will argue further on in the paper.
2. I wish to express my gratitude to Francis Zimmermann for having helped me with the Sanskrit references and having sent me the relevant parts of Meulenbeld's article.
3. For ethnographic descriptions see Babb:1975; Bang:1983; Bhattacharyya:1952; Beck:1969; Egnor:1984; Junghare:1975; Kolenda:1982; Mather & John:1973; Morinis & Brilliant:1981; Nicholas:1981; Roy:1927; Wadley:1980.
4. On the antiseptic properties of neem (Azadirachta Indica Juss.) see Radwanski:1977.
5. For a similar argument in the case of cholera epidemics in the Philippines see Ileto's paper, undated ms.
6. One of these elements which must be mentioned is the sects and their monasteries (mathas) which also have been gifted lands whose produce is reserved for the deities. The head of the monasteries (mahanta) also perform services in the temple (Rösel 1980:90 passim).
7. Rösel gives two separate estimates of the number of mathas in Puri, 91 and 70; 1980:92.
8. See Appadurai 1981 for an illuminating treatment of the topic of honors.
9. I am deeply grateful to Oopalee Aparajita Kennedy for her invaluable help in introducing me to a knowledgeable relative who provided me with much information on this topic. Other informants identified each disease by its name plus mā (mother); others simply called any disease, including smallpox, thākuraṇī, meaning simply goddess; others identified smallpox as basanta or basanta mā. Basanta means also spring, for the disease became epidemic in this season which in India is the hot season (see Nicholas:1981). Another informant said that Śitalā, Mangalā, Bimalā and Budhimā were all of the same family and all connected with disease.
10. The Sanskrit name for smallpox masūrīkā, means an orange pulse (Nicholas:1981); the similarity of the smallpox pustules with orange pulses being the root of this name.

## REFERENCES

- Appadurai, Arjun      Worship and Conflict under Colonial Rule: A South Indian Case, Cambridge University Press, Cambridge, London, New York, New Rochelle, Melbourne, Sydney; 1981.
- Austin, J. L.      How to Do Things with Words, Oxford: Oxford University Press; 1962.
- Babb, Lawrence A.      The Divine Hierarchy: Popular Hinduism in Central India, Columbia University Press, New York and London; 1975.
- Bang, B. G.      "Current Concepts of the Smallpox Goddess Sitala in Parts of West Bengal" in Man in India 53 (1):79-104; 1973.
- Basu, R. N.; Jezek, Z.      The Eradication of Smallpox from India, WHO Ward, N. A.      publication, 1979.
- Bellah, Robert N.;      Habits of the Heart: Individualism and Madsen, Richard;      Commitment in American Life Harper and Row, Sullivan, William M;      N.Y. Cambridge, Philadelphia, San Francisco, Swidler, Ann; and      London, Mexico City, Sao Paulo, Singapore, Tipton, Steven M.      Sidney. (1985) 1986.
- Beck, B. E. F.      "Colour and Heat in South Indian Ritual" in Man 4 (9):553-572; 1969.
- Bhattacharyya, A.      "The Cult of the Goddess of Smallpox in West Bengal" in The Quarterly Journal of the Mythic Society 43:55-69; 1952.
- Brilliant, Lawrence with      "Death for a Killer Disease" in Quest May/June Brilliant, Girija      1978.
- Brubaker, Richard      "The Ambivalent Mistress: A Study of South Indian Village Goddesses and their Religious Meaning" unpublished Ph.D. dissertation. Department of Religious Studies, Chicago University, 1978.
- Canguilhem, Georges      On the Normal and the Pathological Tr. by Cawly Fawcett. Dordrecht: Reidel (1966) 1978.
- Daniel, Valentine E.      Fluid Signs: Being a Person the Tamil Way, University of California Press, Berkeley, Los Angeles, London: 1984.
- Dharampal      Indian Science and Technology in the Eighteenth Century: Some Contemporary American Accounts, Delhi: Impex India, 1971.

- Egnor, Margaret Trawick "The Sacred Spell and other Conceptions of Life in Tamil Culture," unpublished Ph.D. Dissertation. Department of Anthropology, University of Chicago, 1978.
- Egnor, Margaret Trawick "The Changed Mother, or what the Smallpox Goddess did when there was no more Smallpox" in Contributions to Asian Studies, vol. 18:24-25, 1984.
- Foucault, Michel The Birth of the Clinic: An Archaeology of Medical Perception N.Y. Vintage (1963) 1975.
- Foster, Stanley O. "Participation of the Public in Global Smallpox Eradication" in International Health, vol. 93,2:147-149, 1978.
- Foster, Stanley O. "Smallpox Eradication: Lessons Learned in Bangladesh," in WHO Chronicle, 31:245-247; 1977.
- Geertz, Clifford Negara: Theatre State in 19 Century Bali, Princeton University Press, 1980.
- Gelfand, Henry M. "A Critical Examination of the Indian Smallpox Eradication Program," in American Journal of Public Health, vol. 56, No. 10; pp. 1634-1651; Oct. 1966.
- Gomes da Silva, Jose Carlos "Le Pouvoir et la Hiérarchie" ms. Paris 1986
- Greenough, Paul R. "Variolation and Vaccination in South Asia, c. 1700-1865: A Preliminary Note," in Social Science and Medicine, Vol. 14D, pp. 345-347, 1980.
- Hopkins, Donald R. Princes and Peasants: Smallpox in History, University of Chicago Press, Chicago and London, 1983.
- India Today "Danger Signals" pp. 37-38 June 15, 1987
- Ileto, Reynaldo C. "An Alternative to Developmentalist Historiography in the Philippines," undated ms.
- Illich, Ivan Medical Nemesis
- Jolly, Julius Indian Medicine Tr. from German by C.G. Kashikar 2nd Revised Edition. Munshiram Manoharlal, Delhi 1977.
- Junghare, Indira Y. "Songs of the Goddess Shitala: Religio-Cultural and Linguistic Features," in Man in India, Vol. 55, 4 pp. 298-316; 1975.

- Khare Culture and Reality, Institute for Advanced Studies, Simla, 1976.
- Kolenda, Pauline "Pox and the Terror of Childlessness: Images and Ideas of the Smallpox Goddess in a North Indian Village," in James J. Preston (ed.) Mother Worship; University of North Carolina Press, Chapel Hill; 1982.
- Kulke, Hermann "The Struggle between the Rajas of Khurda and the Muslim Subahdars of Cuttack for Dominance of the Jagannatha Cult," in Eschmann, Kulke, Tripathi (eds.), The Cult of Jagannath and the Regional Tradition of Orissa, Manohar, Delhi; 1978.
- Lifton, Robert Jay Home from the War, N.Y. Simon & Schuster, 1973.
- Lifton, Robert Jay Death in Life, N.Y. Touchstone Books, 1976.
- Lifton, Robert Jay The Broken Connection: On Death and the Continuity of Life, N.Y. Basic Books, (1979) 1983.
- Lifton, Robert Jay The Nazi Doctors 1986.
- Marglin, Frederique Apffel Wives of the God-King: The Rituals of the Devadasis of Puri, Oxford University Press, Delhi, New York, Oxford; 1985.
- Mather, R. J.; and John, T. J. "Popular Beliefs about Smallpox and other Common Infectious Diseases in South India," in Tropical and Geographical Medicine, Vol. 25, pp. 190-196; 1973.
- Meulenbeld, Dr. G. Jan "Proceedings of the International Workshop on Priorities in the Study of Indian Medicine" held at the State University of Groningen October 23-27, 1983. Rijksuniversiteit Te Groningen 1984.
- Miller, G. The Adoption of Inoculation for Smallpox in England and France, Philadelphia; University of Pennsylvania Press; 1957.
- Morinis, E. A. "Smallpox Eradication in India: Its Lesson for Applied Anthropology," in Man in India, Vol. 57; 4:357-362; 1977.
- Morinis, E. A. "Brief Communications: Tapping the Flow of Information in a Rural Region: the Example of the Smallpox Eradication Program in Bihar, India," in Human Organization, Vol. 39, No. 2:180-184; 1980.

- Morinis, E. A. and Brilliant, G.E. "Smallpox in Northern India: Diversity and Order in a Regional Medical Culture," in Medical Anthropology, pp. 341-364; summer 1981.
- Nandy, Ashis The Intimate Enemy, Oxford University Press, Delhi, 1984.
- Nicholas, Ralph W. "The Goddess Sitala and Epidemic Smallpox in Bengal," in Journal of Asian Studies, Vol. XLI, No. 1, Nov. 1981; pp. 21-44.
- Nicholas, Ralph W. "The Village Mother in Bengal," in James J. Preston (ed.) Mother Worship, The University of North Carolina Press, Chapel Hill; 1982.
- Obeyesekere, Gananath The Cult of the Goddess Pattini, the University of Chicago Press, Chicago and London, 1984.
- Radwanski, Stanislaw "The Neem Tree," in Journal of International Agriculture, Vol. 29:2,3,4,5; 1977.
- Razzell, P. The Conquest of Smallpox, Firlie: Caliban Books, 1977.
- Redfield, Robert et al "Disseminated Vaccinia in a Military Recruit with Human Immunodeficiency Virus (HIV) Disease" in The New England Journal of Medicine Vol 316, No. 11, March 12, 1987, pp. 673-676.
- Roy, Satindra Narayan "Popular Superstitions in Orissa about Smallpox and Cholera," in Man in India, 7:217-226; 1927.
- Rösel, Jacob Der Palast des Herrn der Welt, Freiburg, 1980.
- Rösel, Jacob "The Economy of an Indian Temple: Landed Endowment and Sacred Food," undated ms.
- Sarkar, Aditi Nath "Sitala in Spring: A Festival of the Goddess of Health and Illness in Bengal" Black and White 16 mm film (40'). Contemporary South Asia Films, Madison, 1986 and Shape Films, Calcutta, 1986.
- Sinha, N.K. "Administrative, Economic, and Social History, 1757-1793," in The History of Bengal (1757-1905), ed. N.K. Sinha, Calcutta, University of Calcutta; 1967.

- Tambiah, Stanley Jeyaraja "A Performative Approach to Ritual" in Proceedings of the Royal Anthropological Academy 1979 reprinted in Culture, Thought and Action Harvard University Press, Cambridge 1985.
- The History of Inoculation and Vaccination lecture Memoranda, American Medical Association, Minneapolis 1913; Burroughs Wellcome & Co., London.
- The Times of London editorial by Pearce Wright, Science editor "Smallpox Vaccine 'triggered' Aids virus" May 11, 1987.
- Turner, Bryan S. The Body and Society Oxford: Basil Blackwell, 1984.
- Wadley, Susan S. "Sitala: The Cool One," in Asian Folklore Studies, 39, 1:33-62; 1980.
- Weir, David and Shapiro, Mark Circle of Poison: Pesticides and People in a Hungry World, Institute for Food and Development Policy, Berkeley 1981.
- Worsley, Peter The Three Worlds: Culture & World Development, The University of Chicago Press, Chicago; 1984.
- Zimmermann, Francis "From Classic Texts to Learned Practice: Methodological Remarks on the Study of Indian Medicine," in Social Science and Medicine, vol. 12, pp. 97-103; 1978.
- Zimmermann, Francis "Rtu-Satmya: The Seasonal Cycle and the Principle of Appropriateness," in Social Science and Medicine, Vol. 14B, pp. 99- 106; 1980.
- Zimmermann, Francis La Jungle et le Fumet des Viandes: un thème écologique dans la médecine hindoue; Gallimard-le Seuil; Hautes Etudes; Paris 1982.