



Epidemiology, Phytotherapy, and Pneumatic Chemistry: Warao Health-Care in Culture- Historical Context

Werner Wilbert

Introduction

The Warao of the Orinoco Delta in Venezuela are one of a drastically reduced number of Native American societies that have survived the European expansion into the Western Hemisphere. Following the time of Discovery, the Amerindian world underwent an era of catastrophic depopulation that unraveled the very fabric of its ethnic identity. Ruinous though this cataclysm and its concomitant scourges of warfare, slavery, expatriation, and coercive culture change may have been, however, no calamity compares in gravity to the genocide visited upon the New World by the introduction of Western pestilence. Exotic epidemic diseases claimed untold millions of lives, causing indigenous populations to decline below their nadirs of no return (Crawford 1988:51; Denevan 1992; Dobyns 1988; Morey 1979; Stannard 1992).

The circumstance that some groups perished while others prevailed challenges modern scholarship to identify the factors that determined their odds of survival. Variables of prime epidemiological importance are bound to have included natural ecological conditions, human-modified environments, as well as frequency and intensity of inter-ethnic contact. Of equal importance, however, though often ignored, was the sociocultural response to disease of survivors like the Warao. Group cohesion in the face of sociobiological turmoil, they had learned, hinges upon social plasticity and resolute medical systems that, in the context of underwriting the physical and psychological well-being of individual and society, aggressively confront new pathologies, promote biomedical experimentation, advocate free exchange of information among practitioners, and involve the community in matters of medical importance.

Inherent in the Warao's habitat and society were particularenvironmental and cultural phenomena—some fortuitous, othersdeliberate—that tended to minimize the epidemiological potential of interethnic contact with other Amerindians and populations of European, Afri-

can, and Asiatic origins. Generally, the foreigners were agricultural people whose economies proved incompatible with the swampland habitats of the Lower Orinoco Delta, thus discouraging the immigrants from extensively colonizing the region. In addition to this factor of environmental causation, there were the particulars of Warao demographics and economics. As foragers of palm resources and as fishermen, their local communities were numerically small (<50 individuals), geographically dispersed, seminomadic, and self-sufficient—all traits that militated against the maintenance and spread of infectious diseases commonly associated with high mortality rates. A deliberate factor of relevance to Warao survival was the group's autochthonous health-care system, comprising such measures of disease prevention and control as ethnic segregation, quarantine, and an overarching homeopathic theory of disease capable of diagnosing and incorporating new pathologies according to principles of pneumatic chemistry. Finally, the scales of Warao survival were favorably weighted by a comprehensive native health-care delivery system that recognized and addressed the interrelationship between the environmental, sociocultural, and psychological variables of the disease experience.

This paper contextualizes the environmental-phytotherapeutic-psychotherapeutic continuum of the Warao's nosohistorical experience, demonstrating how the epidemiological awareness of an Amerindian medical praxis helped bring the millennial society responsible for its formulation into the twenty-first century.

The Nosohistorical Experience

Archaeological and ethnological evidence suggests that people ancestral to the modern Warao have occupied the Orinoco Delta for more than 7,000 years (Rouse and Cruxent 1963; Wilbert, W. 1995:336). In the course of this protracted period of time, the delta experienced three major periods of demographic encroachments that were of primary epidemiological relevance: (1) incursions by Arawak (ca. 3,000 BP) and Carib (ca. 13th century) Indians; (2) infringements by Europeans, Africans, and Asiatics (15th-19th centuries); and (3) interventions by members of industrialized society (20th century).

As to the first period, that of Neo-Indian encroachment, the forebears of the Warao appear to have been the sole inhabitants of the Orinoco Delta until approximately 3,000 years ago, when they began to experience the northward expansion of the Arawak. Whatever health problems may have arisen as a consequence of subsequent interethnic relations, however, indigenous disease lore corroborates pre-Columbian health conditions, suggesting that among Amerindians, cataclysmic epidemics were extremely rare if not entirely lacking (Dunn 1968; Fos-

ter 1978:2; Murdock 1980; Wilbert, J. 1983). While hunter/gatherer societies similar to the nonagricultural Warao did experience pre-adolescent mortality and life expectancy rates comparable to preindustrial Europe, neither these factors nor the prevalence of endemic febrile, respiratory, gastrointestinal, or dermatological infections would have endangered their overall survival (Porter 1997:1-12). Warao lore makes no mention of any significant exchanges of illness between themselves and either Arawak or Carib intruders (Wilbert, J. 1970; Wilbert, W. 1996:17-73). But, in view of the navigational skills of the newcomers, it would probably be erroneous to rule out the likelihood of interethnic disease transmission altogether. Both Arawak and Carib groups were too mobile for this not to have occurred, at least sporadically, during their frequent crossings of the delta en route to and from the Guianas and the West Indies (Heinen 1992:73; Rouse 1985, 1992:42; Tarble 1985). What definitely did play a major role in interethnic disease prevention were certain environmental and attendant economic and distributional conditions that lessened the likelihood of infection by keeping the traditional residents of the delta separate from the intruders.

Thus, the characteristics of the biotope largely restricted the Arawak and the Carib to the levee system of a few major distributaries of the Upper Delta (where cultivation of manioc, their staple food, was feasible). Their presence in the marshlands of the Lower Delta, however, was limited to a small number of isolated villages near the mouths of these distributaries (Heinen 1992:74). The swamp-foraging Warao, in turn, concentrated in the Lower Delta (Wilbert, J. 1996:6), (Map 1.2), where levees become extremely shallow (<2 m.a.s.l.), narrow (<200 m), acidic (pH <5), and distant (>4 km) from the river banks. Furthermore, the Warao generally refrained from erecting their villages along the major distributaries, preferring, instead, the labyrinthine environments created by secondary and tertiary channels, where the forest offered shelter from the intense sun of the dry seasons and protection from the cold, wind-driven rains of the wet seasons (Wilbert, W. 1995:345). Also, fishing, the basis of Warao economy, is much more productive in these shallow channels than in the deep, wide, and windy distributaries. In short, the lower delta environment provided a natural and epidemiologically relevant barrier between the Warao, on the one hand, and the Arawak and the Carib, on the other. Moreover, Warao ideology reinforced the maintenance of social and physical distance from outsiders through the creation of malevolent shape-shifting bush-spirits, such as bahimo, banaru, and masisikiri, who, representing the "others," were thought capable of kidnapping and/or seducing individual Warao, with dire health consequences for the victim (Wilbert, W. 1992:75-81).

Finally, with respect to controlling the spread of infectious disease during the pre-Columbian era of Warao history, mention must be made of the Warao's deliberate practices of quarantine and ethnic segregation. Regarding the former, trade relations with Arawak and Carib partners, though highly valued by the Warao, were generally limited to commercial excursions by small parties of men. Returning from trading expeditions, the travelers were obliged to spend ten to fifteen days in quarantine at some distance from their village before they were allowed to re-join their families.

The Warao's epidemiological panorama reached its peak potential during the society's second nosohistorical period—that is, the infringement of their territory by immigrants from farflung regions of the Eastern Hemisphere. As in the case of the Arawak and Carib, however, the agricultural economies of the new arrivals were not feasible in the marshland environments of the delta, so colonization efforts by Old World immigrants affected primarily extradeltaic regions like the Island of Trinidad, the Peninsula of Paria, and areas adjacent to the apex of the Orinoco Delta. Initially, contacts between these people and the Warao were frequent but of short duration, as the newcomers used the delta mainly as a convenient thoroughfare to the mainland interior. A most decisive nosohistorical event was spurred by the 'pacification' campaigns of European missionaries in the 16th and 17th centuries, which forced thousands of Warao, Arawak, and Carib to relocate in multi-ethnic settlements in or around mission stations to the west and south of the delta (Wilbert, J. 1996:263). It was here that the Warao became all too familiar with the pathologies and genocidal consequences of Old World pestilential disease that drained the life from the communities of their aboriginal neighbors (Wilbert, J. 1983:358, 1996:40-45; Wilbert, W. 1986:30-33; Table 1). In response to the formidable epidemiological threat presented by their new environment, scores of Warao retreated from the missions to take refuge in the epidemiological sanctuary of the delta.

Having found no evidence of a precipitous population decline in the Orinoco Delta during this second period of outside contact, it is difficult to determine how many Warao fell victim to these diseases, or whether outbreaks transpired within the boundaries of their habitat. Nevertheless, awareness of foreign plagues is clearly signaled in Warao disease lore, which contains detailed accounts of yellow fever, dengue hemorrhagic fever, malaria, pertussis, pulmonary tuberculosis, measles, poliomyelitis, leprosy, and smallpox (Wilbert, W. 1996:17-73). In the corresponding mythological texts their names are prefixed by hebu to distinguish them from endemic diseases (Wilbert, W. 1996:25-26).

TABLE 1
 EPIDEMICS REPORTED FROM TERRITORIES PERIPHERAL TO
 THE ORINOCO DELTA (1600-1900)

Region	Period	Reported Outbreaks	References*
Trinidad	1700-1900	Cholera, hemorrhagic malarial fevers, leprosy, malaria, malignant comatose fevers, measles, smallpox, typhoid, yellow fever	Arraiz; Brown; Newson; Weller.
Venezuelan mainland	1600-1900	Smallpox, influenza, pneumonia, pleurisy, malaria, tick-born relapsing fevers, bubonic plague	Morey
Guyana	1800s	Cholera, influenza, intermittent fevers, malaria, pleurisy, smallpox	Daly; Dwarka; Menezes; Rodney

***Legend:** Arraiz 1954:99; Brown 1977:290-296; Daly 1975:53; Dwarka 1950:329-220; Menezes 1979: 19; Morey 1979; Newson 1976:35-219; Rodney 1981:33, 240; Weller 1968:90-94, 113.

Typically, accounts of exotic diseases evolve in a mythical Warao village where a child is the first to notice a person who is chronically ill with a particular infectious disease. The child notifies the shaman who proceeds to make his own covert observations. Alarmed by the situation, he confronts the individual, denouncing him as a spirit (hebu) and as the master of the spreading disease. Sometimes these confrontations result in altercations and fighting (possibly epidemics) between the people and the spirit, causing the latter's dissolution and the loss of many Warao lives. Usually, however, the spirit attempts to convince the shaman that he is indeed a "true Warao." But then he admits to being non-human. The shaman banishes the disease spirit to the outskirts of the delta (locations of initial outbreaks listed in Table 1), from where, in revenge for his ostracism, the spirit threatens to "will" future epidemics upon the community by contaminating the air, water, or fomites of their environment with the disease he embodies.

The third nosohistorical period of deltaic encroachment, the era of contemporary society, began with the establishment of boarding schools by Capuchin missionaries soon after the founding of their first permanent mission station in Warao territory, in 1925 (Heinen

1988:603). This was followed by the creation of small-scale lumber and palm-heart industries (1950s), a flood-control project on the Manamo distributary, and the founding of a preliminary network of primary health-care clinics (1960s), small-scale tourism (1980s), and, last but not least, the initiation of full-scale multinational oil-drilling activities in territories west of the Macareo River and in the Gulf of Paria (1990s).

Official health statistics for the contemporary Warao list as the ten principal causes of morbidity due to infectious diseases and by frequency: helminthic infestations, gastroenteritis, diarrheas, influenza, angina streptococcus, pneumonia, dysentery, measles, pertussis, and malaria. Over a 30-year period (1950-1980) rural clinics in the delta reported an average of 4,019.6 cases and 32.6 deaths per year (Wilbert, W. 1984:13). Although malaria is not considered endemic to the delta proper—between the Río Grande and Manamo distributaries—it is so to the immediate south and west of these boundaries. The few cases that have been diagnosed within the Warao habitat represent individuals who, for various reasons, had crossed into the malarial areas.

The same official statistics rank the ten principal causes of death due to infectious diseases among contemporary Warao as gastroenteritis, pneumonia, tuberculosis, tetanus, measles, helminthiasis, dysentery, diarrheas, influenza, and typhoid fever, with an average of 3,611.20 cases and 42.50 deaths per year (Wilbert, W. 1984:35).

The relatively low incidence of virulent epidemics among contemporary Warao, is also due to prophylactic programs sponsored by rural clinics in the area. Since the mid-1970s, these health posts have conducted vaccination campaigns on a quasi-regular basis against typhoid, tuberculosis, yellow fever, DPT (diphtheria, pertussis, tetanus), and measles (Wilbert, W. 1984:102-103). The irony of the current situation is that the same fortuitous conditions that buffered the Warao against the diseases that ravaged their neighbors now make it equally difficult for Western doctors to attend to the communities assigned to their care. Nevertheless, according to Western medical observations, the overall health of those Warao who continue to maintain a certain degree of physical and social distance between themselves and the Creole peasant population (with their “soda cracker” diets) is considered to be rather “privileged” (Layrisse and Layrisse 1980:160-165).

Principles of the Pneumatic Health-Care System

A casual observation of Warao health-care delivery may give the impression of general apathy, on the part of the practitioners and the community, toward the ill. Oftentimes, patients are found quietly suffering and seemingly unattended to in hammocks slung in far corners

of their houses. In actual fact, however, the sick are never abandoned. What appears as such are usually episodes, following diagnosis, when medications are being prepared, quarantine is observed, or patients convalesce.

Owing to the numerous environmental and social variables that need addressing, diagnosis within the Warao health-care system is a complex procedure. According to the prevailing worldview, humans do not dominate the environment. Rather, individual and society are placed into an ecological context, designed to guarantee the equilibrium of the natural order of things. Within a web of ecological relationships, humans are, instead, held highly accountable for actions towards their society and environment. Even so, however, compliance with the natural order offers no guarantees other than mere survival, while transgressing the order threatens infliction of themselves, their loved ones, or the community with disease (Wilbert, J. 1983; Wilbert, W. Ms.).

In order to image the causal relationships between compliant/deviant behavior and health/disease, Warao ideology pictures the natural world as organized into dynamic and equally ranked bands of extended 'families', equivalent to ecological communities. Like bands in Warao society, ecological communities operate under a mother figure as their ontological center. Furthermore, just as Warao society depends on its shamans to function as keepers of telluric, cultural, and cosmological wisdom, as conflict mediators, and as defenders of the natural order, so do ecological communities have their own shamanic guardians who enforce the socioenvironmental norms within and between them. In other words, the 'supernatural cohort', of which the shaman-healer is a part, epitomizes the natural, though biologically violent, events intrinsic to the equilibrium processes in any given ecosystem (Wilson 1992:3; Wilbert, J. 1983; Wilbert, W. Ms). Even Western skeptics of supernatural/mortal relationships must concede that disease affects and is affected by the emotional state of the patient. It follows, therefore, that the supernatural drama that conditions a Warao's every move within his or her natural and social environments represent the psychosomatic constituents of biological disease. Thus, the totality of the natural environment, the psychotherapeutic effects of the shaman, and the medications prepared by the phytotherapist integrates the environment-psychotherapeutic-phytotherapeutic continuum of Warao health care and disease.

Pathology of Pneumatic Disease

Warao pathology employs a simple bipolar model based on pneumatic chemistry to explain the physiological effects of odors on living organisms (Figure 1). On one end of the spectrum is fetid gas, the etio-

logical agent of disease. Its odoriferous quality is likened to, and possibly even modeled after, the nauseating properties of hydrogen sulfide and/or methane, which abound in the swamps of the Orinoco Delta. Rather than recognizing it as a chemical byproduct of organic decomposition, however, native theory claims fetid odor to exist simply in and of itself.

Fetid Gas	Inodorate	Fragrant Gas
Disease	Health	Medicine

FIGURE 1
BIPOLAR MODEL OF PATHOLOGY
BASED ON PNEUMATIC CHEMISTRY

Natural reservoirs of pathological gas include such common swampland environments as stagnant pools, peat bogs, and backswamps where organic decomposition is a perpetual process. Under propitious conditions, the gas is theorized to form a "chemical" bond with ambient air, water, or solids (fomites), which serve as expedient vehicles of transmission to a susceptible host. Although the at-risk populations include primarily the 0 - 5 years and the elderly age-groups, more resistant adolescents and adults are not entirely immune. Stress produced by severe crisis situations, for example, is believed to render them equally susceptible.

Transmission to a susceptible host occurs via inhalation and ingestion, as well as through dermal contact with any of the gas-bonded vehicles. Once on the surface or inside the victim, the bond dissolves, liberating the gas. The gas, then, is attracted by and adheres to those regions of the body (head, thorax, abdomen, skin, eyes, etc.) that are most vulnerable at the time of transmission. Specific sites and relative virulence tend to vary with sex and age. Rather than being organ-specific, the gas tends to produce systemic disorders. Practitioners explain this to be the cause of malaise that accompanies severe febrile, respiratory, and gastrointestinal disease. Within the host, fetid gas may bond with bodily fluids and gases, such as sputum, urine, sweat, feces, tears, blood, flatus, and aspirated air. Upon elimination, these components remain contagious and capable of infecting others in much the same way (hand-to-mouth, inhalation, or direct contact) by which the first victim was rendered ill.

Diagnosis of Pneumatic Disease

Not all illnesses are considered life-threatening. The abnormal persistence of symptoms coupled with increasing severity, however, generates serious concern among health practitioners. Because of the large number of variables that might bear on a particular case, the diagnostic protocol often entails a protracted procedure that may take several days (Table 2). First, the suspected pneumatic pathogen, not being disease-specific, makes an accurate differential diagnosis all the more important. Second, the epidemiological theory allows for children falling ill because of environmental or social transgressions committed by their parents or adult siblings. Should causations like these be suspected, the transgressor(s) must be found and counseled before a cure can be fully achieved. Finally, adults, especially the elderly, may suffer from illnesses produced by abnormally high levels of stress, repeated frustration, and desperation. In addition to symptom-specific medicine, therefore, these patients require special psychotherapeutic attention to overcome their mental anguish and to readjust to their biocultural environment.

TABLE 2
DIAGNOSTIC PROCEDURE FOR DISEASES
SUSPECTED TO BE OF PNEUMATIC ORIGIN

Phase	Protocol
1	Isolation
2	Reassurance
3	Standardization of olfactory stimuli
4	Suppression of undesired audible interference
5	Acquisition of case history
6	Determination of origin and reason of illness
7	Determination of appropriate therapy

Representing a potential threat to the community, a new patient is commonly placed in isolation, a simple procedure that entails the clearing of a corner in the dwelling where his or her hammock is slung and the placing of a temporary hearth with glowing embers on the floor below or close to the hammock. Although the shaman and the phytotherapist who will perform the diagnosis are likely to be members of the patient's own extended family, other adult relatives will rotate their presence throughout the diagnostic procedure to reassure the patient

of his or her intrinsic worth to the community and to show that everything will be done to achieve complete recovery.

Shortly after sundown, the shaman arrives with a basket of paraphernalia under his arm. One of his first objectives is to prevent the pneumatic agent afflicting the patient from circulating among the attendants. To accomplish this, he standardizes the olfactory stimuli pervading the immediate area. From his basket he produces a small ball of resin (*Protium guianensis*) and a cigar, preferably containing black tobacco (*Nicotiana rustica*). As he softens the resin between his hands, it begins to emit the penetrating odor of menthol. With his impregnated hands he rubs his face and chest and proceeds to do the same to the patient. On occasion, he also places granules of the resin on the embers under the patient's hammock to produce a continuous incense throughout the evening. To complete the desired olfactory environment, the shaman lights the cigar and fumigates the patient's body.

Just as a Western physician obtains privacy by closing the door or curtain of the examination room, so does the shaman suppress undesired auditory interference produced by the normal din of the village. Turning again to his basket, he produces a large rattle. Rotation of the instrument in a prolonged and rhythmic fashion produces a hissing sound, similar to white noise. Through this "sound filter" only his own voice and that of his patient are clearly audible.

Having established a safe and propitious environment, the shaman begins a detailed consultation with the patient to obtain a case history of events that led up to the illness. This allows him to determine whether the illness is due to mystic retribution for deviant behavior of the patient and/or a third party, or whether an accidental encounter with any one of the mentioned disease reservoirs has taken place. If the former is the case, the shaman intercedes with the disgruntled 'guardian(s)' on behalf of his patient, attempting to restore the desired equilibrium. In case of the latter, the practitioner reiterates for the benefit of the patient (and everyone present), the dangers associated with disease reservoirs. Once the diagnosis is completed and the psychosomatic parameters of the illness have been dealt with, the patient is placed in the care of the phytotherapist. She proceeds with a treatment specifically designed to restore the patient's health through eviction of the pathological odor from his or her body.

Pneumatic Therapy

According to the bipolar model depicted in Figure 1, medicine is identified as fragrant therapeutic gas diametrically opposed to fetid pathogenic gas. Although the effects of the two gases are essentially different, they do have certain principles in common. Neither of them pos-

esses animated qualities and neither is a chemical derivative. Both bond with air, water, and solids, which dissolve inside the host and rebond with materials of similar properties?

In contrast to fetid pathogenic gas, fragrant therapeutic gas exhibits an aromatic spectrum of disease-specific qualities. It is tropic for particular corporal regions, associated with reservoirs of prolific botanical growth, and is believed to be of a greater density than fetid gas. One or more fragrant gases may be typical of a particular botanical species in which they bond with the plant's sap, water, or resin and concentrate in recently formed tissues (flowers, leaves, bark, roots), with maximal exposure to sun, wind, and rain.

Thus, in order for a remedy to be effective, the phytotherapist must select the fragrance (or combination of fragrances) appropriate for a particular health condition, identify the botanical species that harbor them, liberate the gas-bonded fluids from the tissues without altering their chemistry, and administer the aromatic medication in a fashion conducive to reaching the target area for maximum therapeutic effect.

When presented with a particular case, the phytotherapist contemplates the outcome of the shamanic diagnosis and examines it in the light of her own experience. Lest her efforts be futile, she accepts a patient only if she is convinced that any socioenvironmental problems influencing the disease have been resolved. Although decision making within the phytotherapeutic protocol is relatively quick, it is, nonetheless, complex and manifests the professional capacity of its practitioner (Table 3).

TABLE 3
TREATMENT PROCEDURE FOR DISEASES
OF KNOWN PNEUMATIC ORIGIN

Phase	Protocol
1	Differential diagnosis
2	Determination of disease-specific therapy
3	Acquisition of phytomedical ingredients
4	Processing
5	Administration

The first phase of phytotherapeutics involves a differential diagnosis that establishes whether the case at hand represents a single disease (cough, diarrhea, fever), one of multiple causation (gastroenteritis, measles, pulmonary tuberculosis), or one of multiple infections.

The second phase entails the determination of a disease-specific therapy. Since each botanical species of the pharmacopoeia is associated with one or more fragrant gases, identified by the name of that species, the phytotherapist must decide whether one gas will suffice to effect a cure or whether the patient requires a combination of gases derived from one or several species.

In most instances, acquisition of phytomedicinal ingredients is accomplished by the practitioner who may be accompanied by a daughter desirous of learning the art of herbal healing. Advanced apprentices are proficient enough to retrieve the *materia prima* on their own.

Although Warao phytotherapy is not a ritualized practice, the herbalist does identify with Daunarani, the Forest Mother. She is one of the personified shamanic guardians, mentioned earlier, whose extended family (ecological community) comprises the major trees of the deltaic flora (Wilbert, W. 1987). Through the incessant care of her family, she establishes a propitious environment for fragrant gases to bond with the "blood" of her offspring (medicinal materials) and delivers the aromatic substances herbalists require to heal their patients.

To avoid possible transgressions, the phytotherapist keeps a detailed inventory of young trees (saplings) whose components she uses to prepare her medicine. This precaution avoids the predicament of having to choose between felling a tree to save one of her own people or to abandon her patient for the sake of saving a member (tree) of the Forest Mother's family.

The processing phase entails the meticulous extraction of the fragrant gas from the plant tissue into a medium that can be administered to the patient. Depending on the medication, this phase may require a simple one-step procedure or a lengthy protocol of up to seven steps of heating, cooling, mixing, filtering, and so on (Wilbert, W. 1996:171-178). Utmost care is taken to ensure that the fragrant gas bonds with the intended medium and is not lost to a dissipating byproduct, such as the steam from an overheated concoction. A mistake like this is considered wasteful and irresponsible by the forest guardian, who will retaliate by punishing the healer's inappropriate behavior.

Once the medicament is successfully processed, the phytotherapist begins the fifth and final phase of her treatment procedure, that of administration. The medication, composed of one or more fragrant therapeutic gases, is properly bonded to a medium (solid, liquid, vapor) and ready for conveyance to the afflicted body region according to a prescribed regimen. At the disease site, the medium/fragment gas bond dissolves and the fetid gas is physically displaced and expelled from the body by way of the corporal portholes of mouth, nose, and rectum. Outside the patient's body, it dissipates into the atmosphere until it bonds again with a vehicle of an appropriate reservoir. In due time, the fra-

grant therapeutic gas also exits the patient's body via the same route(s), dissipates, and re-bonds with an appropriate botanical reservoir. Thus, neither the pneumatic pathogen nor the pneumatic medicine are destroyed. Both agents simply participated in an event in which the former adversely affected a human host through contact and the latter displaced it through the skillful manipulation of the phytotherapist. Therapy is considered successful once the patient has achieved an inodorate state; that is, the state defined by the Warao as 'being healthy' (Figure 1).

Concluding remarks

Throughout their protracted history in the Orinoco Delta, the Warao have benefited from propitious environmental and demographic conditions that greatly curbed the persistence and spread of infectious diseases. Nevertheless, had it not been for their heightened epidemiological awareness that controlled their contact with the outside world, the Warao would probably have paid as heavy a death toll as most Amerindian societies of the Caribbean, the Orinoco Basin, and the American continent as a whole.

For the Warao, disease is not so much a part of the human condition as it is the consequence of personal or public failure to maintain a socioecological equilibrium. Norms regulating environment and society are transmitted to and internalized by all members of the group in a lifelong process of enculturative learning. While this theory holds the individual accountable for personal and communal health it, simultaneously, effects sound ecological judgment that conditions the long-term well-being of the group.

The extraordinary attention Warao pay to the odiferous properties of biological degeneration (disease), regeneration (therapy), and psychological stability (health) makes explicit the physiological effects of odors on the human organism and the existence of a synergetic relationship between the pragmatic conditions of pneumatic chemistry and shamanistic ideation. Unfortunately, the study of this system is severely handicapped by the lack of a precise terminology for olfactory stimuli. Ethnoecologists and scholars engaged in the study of chemical communication among humans through airborne molecules ought to cooperate and identify odors on a molecular level, place them in a space/time continuum, determine their physiological effects on the human organism, and ascertain the influence of culture learning (enculturation) on the perception of and reaction to individual odors (Almagor 1987; Classen 1992; Cohen 1988; Howes 1987; Krogstad 1988; Synnott 1991: 493). Although this cannot be further elucidated in the context of the present paper, recent advances in the study of hu-

man pheromonal communication and aroma therapy hold out considerable promise in this respect. Meanwhile, culture-specific studies of pneumatic health theories like the Warao's can provide important insights into native definitions of odor categories and appertaining human responses.

The Warao's pneumatic theory of health, for instance, clearly associates "fetid" with the processes of organic decomposition. Decomposition, in turn, is equated with the processes of human infirmity and dying. Smells associated with disease and death form one specific category of odor that effects subconscious communication between healers and patients.

According to Warao health theory, "fragrant", connotes the reversal of decomposition, of vitality, and of motherhood. Phytotherapists derive their materia medica from the plant world, which in shamanic ideational context is governed by the Forest Mother. Most therapeutic species are daughters of this great Mistress who yield their healing essences to female health practitioners. Primarily dedicated to the healing of infants and children, these herbal healers, by Hawaiian kinship reckoning and uxorilocal residence rule, are usually consanguineal or classificatory mothers of their patients. The presence of their mother's scent in association with herbal aromas is bound to impart feelings of confidence and protection in them, unconsciously furthering the healing process. Thus, the scent of the mother herbalists and the environmental fragrancing peculiar to her practice may form a second category of odors pertaining to Warao health theory.

Finally, the Warao associate "inodorate," or the natural body odor of men and women, with health. Unaffected by any odors of degeneration or regeneration, the natural scent of clean male and female bodies constitutes a basic odoriferous quality of the members of the community and a likely third category of odors in the context of the Warao's native theory of health.

Abstract

From an epidemiological perspective, the medical system of the Warao applies relatively advanced theoretical concepts in addressing the environmental, social, and therapeutic as they relate to the treatment and prevention of infectious disease. Modeled after causal relationships observed in the environment, the paradigm governing health-care and health-care delivery is based on pneumatic qualities associated with biological stability (health), organic decomposition (disease, dying, and death), and proliphic growth (medicine). The diagnostic protocol for suspected pneumatic diseases entails a comprehensive prœss that requires the active participation of the patient in identifying the environ-

mental, social, psychological, and ideational variables causing his/her particular condition. Accordingly, therapy involves measures of intensive psychological support for the patient as well as thorough phytomedical attention. Both are designed to reestablish the desired mental and physical equilibrium which the Warao define as the state of health.

Resumen

Desde una perspectiva epidemiológica, el sistema médico Warao utilice conceptos teóricos relativamente avanzados que contemplan lo ambiental, lo social y lo terapéutico en el tratamiento y prevención de enfermedades infecciosas. Modelado según fenómenos interactivos observado en el ambiente, el paradigma que rige la medicina y su suministro se basa en cualidades neumicas relacionadas con la estabilidad biológica (salud), la descomposición (enfermedad, el morir y la muerte), y el crecimiento prolífico (medicina). El protocolo de diagnosis empleado para determinar enfermedades sospechadas de ser de origen neumatica representa un proceso comprensivo que requiere de la participación del paciente en la determinación de aquellos variables ambientales, sociales, psicológicas y ideológicas que promueven su condición en particular. Del mismo modo, la terapia aplica medidas de un intenso apoyo sociológico hacia el paciente al igual que la atención fitomédico. Ambas están diseñadas para re-establecer el equilibrio mental y físico, un estado que el Warao define como "salud".

References

- Almagor, Uri
1987 "The Cycle and Stagnation of Smells: Pastoralists-fishermen Relationships in an East African Society." *Res* 13:107-121.
- Arraiz, Antonio
1954 *Historia de Venezuela*. Caracas: Fundación Eugenio Mendoza.
- Brown, A.W.A
1977 "Yellow Fever, Dengue and Dengue Hemorrhagic Fever." In G. Melvin Howe, ed., *A World Geography of Human Disease*, pp. 42-63. New York: Academic Press.
- Classen, Constance
1992 "The Odor of the Other: Olfactory Symbolism and Cultural Categories." *Ethos* 20(2):133-166.
- Cohen, Erik
1988 "The Broken Cycle: Smell in a Bangkok Soi (Lane)." *Ethnos* 53(1-2):37-49.

- Crawford, Michael H.
 1998 *The Origins of Native Americans: Evidence from Anthropological Genetics*. Cambridge: Cambridge University Press.
- Daly, Vere T.
 1975 *A Short History of the Guyanese People* London: MacMillan Education.
- Denevan, W.
 1992 *The Native Populations of the Americas in 1492* University of Wisconsin: Wisconsin Press.
- Dobyns, Henry F.
 1988 "Reassessing New World Populations at the Time of Contact." Paper presented at Institute for Early Contact Studies, University of Florida at Gainesville, April.
- Dwarka, Nath, M.B.E.
 1950 *A History of Indians in Guyana* London: Published by the author.
- Dunn, Frederic L.
 1968 "Epidemiological Factors: Health and Disease in Hunter-Gatherers." In R.B. Lee and I. De Vore, eds., *Man the Hunter*, pp. 221-228. Chicago: Aldine.
- Foster, George M.
 1978 *Medical Anthropology*. New York: John Wiley & Sons.
- Heinen, H. Dieter
 1988 "Los Warao." In Walter Coppens and Bernarda Escalante, eds., *Los Aborígenes de Venezuela, vol 3, Etnología Contemporánea, part 2*, ed. Jacques Lizot, pp. 585-689. Monograph 35. Caracas: Fundación La Salle/Monte Avila Editores.
- Heinen, H. Dieter
 1992 "Early Colonization of the Lower Orinoco River and Its Impact on Present-day Indigenous People." *Antropológica* 78:51-86.
- Howes, David
 1987 "Olfaction and Transition: An Essay on the Ritual Uses of Smell." *The Canadian Review of Sociology and Anthropology* (CRSA) 24(3):398-416.
- Krogstad, Anne
 1988 "The Treasure House of Smell: From an 'Unsensing' to a 'Sensual' Anthropology". *Folk* 30:87-103.
- Layrisse, Miguel, and Zulay Layrisse
 1980 "Biomedical Observations on the Warao." In *Demographic and Biological Studies of the Warao Indians* ed. Johannes Wilbert and Miguel Layrisse, pp. 160-165. UCLA Latin

- American Studies, vol. 45. Los Angeles: University of California, UCLA Latin American Center Publications.
- Menezes, Mary Noel
 1979 *The Amerindians in Guyana 1803-1873*. London: Frank Cass Publishing.
- Morey, Robert V.
 1979 "A Joyful Harvest of Souls: Disease and the Destruction of the Llanos Indians." *Antropológica* 52:77-108.
- Murdock, George P.
 1980 *Theories of Illness: A World Survey* Pittsburg: University of Pittsburg Press.
- Newson, Linda A.
 1976 *Aboriginal and Spanish Colonial Trinidad: A Study in Culture Contact* San Francisco: Academic Press.
- Porter, Roy
 1997 *The Greatest Benefit to Mankind: A Medical History of Humanity*. New York: W.W. Norton & Company.
- Rodney, Walter
 1981 *A History of the Guayanese Working People: 1881-1905* London: The Johns Hopkins University Press.
- Rouse, Irving
 1985 "Arawakan Phylogeny, Caribbean Chronology, and Their Implications for the Study of Population Movement." *Antropológica* 63-64:9-21.
 1992 *The Tainos: Rise and Decline of the People Who Greeted Columbus*. New Haven: Yale University Press.
- Rouse, Irving, and J.M. Cruxent
 1963 *Venezuelan Archaeology*. New Haven: Yale University Press.
- Stannard, David E.
 1992 *American Holocaust: Columbus and the Conquest of the New World*. Oxford: Oxford University Press.
- Synnott, Anthony
 1991 "A Sociology of Smell." *The Canadian Review of Sociology and Anthropology* 28(4):437-459.
- Tarble, Kay
 1985 "Un nuevo modelo de expansión Caribe para la época prehispánica." *Antropológica* 63-64:45-81.
- Weller, Judith Ann
 1968 *The East Indian Indenture in Trinidad* San Juan: University of Puerto Rico.
- Wilbert, Johannes
 1970 *Folk Literature of the Warao Indians: Narrative Material and Motif Content* Latin American Center Publications, vol. 15. Los Angeles: University of California, Los Angeles.

- 1983 "Warao Ethnopathology and Exotic Epidemic Disease." *Journal of Latin American Lore* 7(1):37-72.
- 1996 *Mindful of Famine: Religious Climatology of the Warao Indians*. Religions of the World, ed. Lawrence E. Sullivan. Cambridge: Harvard University Center for the Study of World Religions.
- Wilbert, Werner
- 1984 "Infectious Diseases and Health Services in Delta Amacuro." *Acta Ethnologica et Lingüística: Series Americana* vol. 10. Fohrenau: Engelbert Stiglmayr.
- 1986 "Warao Herbal Medicine: A Pneumatic Theory of Illness and Healing". Ph.D. Diss. University of California, Los Angeles.
- 1987 "The Pneumatic Theory of Female Warao Herbalists." *Social Science and Medicine* 25(10):1139-1146.
- 1992 "Bush-spirit Encounters in Warao Life and Lore." *Antropológica* 77:63-92.
- 1995 "Conceptos Etnoecológicos Warao." In *Naturaleza y Ecología Humana en el Neotrópico/ Nature and Human Ecology in the Neotropics*, ed. H. Dieter Heinen, José J. San José, and Hortensia Caballero Arias. Scientia Guaianae, vol. 5. Caracas:
- 1996 *Fitoterapia Warao: una teoría pneumica de la salud, la enfermedad y la terapia*. Caracas: Fundación La Salle de Ciencias Naturales/Instituto Caribe de Antropología y Sociología, Monografía 41.
- Ms. "Warao Spiritual Ecology." In *Indigenous Traditions and Ecology*, ed. John Grim and Lawrence Sullivan. *Religions of the World and Ecology*, ed., Mary Evelyn Tucker and John Grim Cambridge: Harvard University Center for the Study of World Religions. (In press).
- Wilson, Edward O.
- 1992 *The Diversity of Life*. Cambridge: The Belknap Press of Harvard University Press.

Instituto Venezolano de Investigaciones Científicas
 Departamento de Antropología
 Apartado 21.827
 e-mail wwilbert@medicina.ivic.ve
