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Grim Fairy Tale

Comments on some Matters Raised in *The Hansel and Gretel Syndrome* by N. van Dijk

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ABSTRACT

A "critique of Houghton's cold adaptation hypothesis" by van Dijk is examined. The principles underlying the hypothesis do not seem to be understood, and other misinterpretations are evident.

Key words: POLYNESIA, PHENOTYPE, HEAT-BALANCE.

Since the appearance of the paper that is the focus of van Dijk's attention, I have published two others bearing on the matter of body heat-balance and the evolution of Pacific *Homo sapiens* (Houghton 1991a, 1991b). Some of the points raised by van Dijk are discussed in these, and it may be useful to set out the present situation. In addition, the van Dijk paper ranges rather beyond that immediate matter, and some statements in it need scrutiny.

At the outset I must gently protest at the description of this idea or model as "overly simplistic and unicausal". The 1990 paper was, to my knowledge, the first quantitative presentation of an idea that seems to have existed only vaguely in the oral tradition of anthropology. In such a situation, a particular argument and close focus are required. Re-reading that paper, I do not find in it any insistence that nothing else influences phenotype.

Initially, van Dijk identifies several important questions as requiring address, so I repeat and comment on these.

1. *If the ideal place for the evolution of this body form is Island Melanesia, why have the populations now living in that region not similarly evolved?* Answer: where appropriate, they have (Houghton 1991b).
2. *Why do Polynesians have so many South-east Asian genes?* Answer: because, like everyone else in the Pacific, their ancestors came out of South-east Asia. However, the problem with this sort of wording is that it too readily leads to thoughts of descent from a group similar to some extant Asian group. I think the more helpful way to word this is that Polynesians and some extant Asian groups share genetic characteristics indicative of a common ancestry. Further back, of course, the same applies to earlier entrants into the Pacific and ultimately to Africans.
3. *How could Polynesians have evolved before leaving the voyaging safety net...of Island Melanesia, i.e., before encountering the very conditions which supposedly provoked phenotypic selection?* Answer: some were exposed. This aspect is covered in the 1991b paper, which traces the changing phenotype with exposure to the sea within Island Melanesia.

4. *Why are Polynesians phenotypically closer to Indonesians and South-east Asians...than to the Melanesians from whom they supposedly have evolved?* Answer: We have analysed Polynesian head form from a biological vantage (e.g., Houghton and Kean 1987), considering them to be distinctive amongst *Homo sapiens*, and relate this to biological demands. In body phenotype, the inhabitants of prehistoric Remote Oceania in general appear to have shared a similar morphology, which again we relate to biological demands. Others may favour an inductively/statistically-derived taxonomy of uncertain connection with biological theory. Thus: "Functional guiding principles in the choice of measurements are lacking, and I have simply tried to cast a wide net so as to comprehend external shape metrically" (Howells 1973: 48); and "...if enough measurements are compared, the degree of similarity in pattern will be proportional to the degree of genetic relationship despite possible differences in aspects of selection" (Brace *et al.* 1990: 327). A long time ago R. A. Fisher, in a paper specifically directed at craniometric studies, commented that "the theoretical concepts developed in the subject have lagged far behind the mass of observational material which has been accumulated", a fact which he ascribed partly to "an intuitive confidence, widely held in other fields, though everywhere difficult to justify, that, by amassing sufficient statistical material all difficulties may ultimately be overcome" (Fisher 1936: 61).

In this question also is raised the matter of typology: 'the Melanesians'. In a biological sense there are no such people. Friedlaender (1975: 215) put it well: "People will inevitably persist in the naming of racial groups based on simple physical and even social attributes, but, at the very least they should be made aware how grossly simplified any such taxonomic system has to be, and the diversity which a name such as 'Melanesian' masks." The term Melanesian should be a geographic statement, indicating someone living within the confines of Melanesia. No phenotypic or genotypic uniformity can be implied by the term.

I now address the various sections of the paper.

BIOLOGICAL AFFINITIES

My disagreement with much of the 'orthodox' thinking in this section is set out in various papers. I confine comment to the paragraph on "*why Polynesians should have been relatively so enormous, while Micronesians are more like Southeastern Asians in general build*". I do not understand why the post-contact devastation of the western Micronesian populations and subsequent introduction of South-east Asian genes (Cordy 1983; Thompson 1932) is so widely ignored. The early descriptions are different. "The Marianos are in colour a somewhat lighter shade than the Filipinos, larger in stature, more corpulent and robust than Europeans" (Garcia 1683: 21). Oliver (1961: 335) summarises the early descriptions of the Chamorros: "—in other words, much like Polynesians". For the Caroline Islands, Hezel (1983: 53) summarises the contact record: "From the accounts of earlier travellers through the atolls of the western Carolines, a physical description of the islanders could easily be pieced together: a sturdy, well-built people of medium stature". After World War Two, the people of isolated Ulithi were still well adapted to their oceanic environment (Lessa and Lay 1953; Houghton 1991b). My "failure to distinguish between the robust and

gracile phenotypes" arises because in terms of muscularity and heat balance such a contrast did not exist in prehistory.

VOYAGING

The matter of evolution of an oceanic phenotype in Island Melanesia is covered in the 1991 papers. Anyone who thinks that keeping warm at sea in a small craft is a "relatively simple task" should try it. The 1991a paper provides some interesting anecdotes from survivors. What neolithic technology could achieve is protection from the wind, which the physiological analysis shows to be crucial.

CLIMATE

"Bergmann's rule states that populations in colder areas tend to be bulkier (i.e., shorter and more compact) than those living in warmer areas...tall, slender individuals...are found in hot environments, while short bulky individuals...live in cold environments...Polynesians, however, fall into neither of these categories. Although tall, they are by no means slender, which suggests that they are adapted to neither cold nor hot conditions."

These words suggest that the author does not quite grasp the principles of body temperature homeostasis, Bergmann's rule, or the rather extensive literature on body variation with climate. She is therefore at a disadvantage in analysing the heat-balance argument. Cold climate peoples are not necessarily "shorter and more compact" than hot climate peoples. Hot climate peoples are not necessarily tall. It is the relationship between body mass and body surface area that determines for the unprotected body the balance between heat production and heat loss. Relative to mass, surface area should be greater in hot climates and less in cold climates. Hot climate peoples may be tall and thin or short and thin, depending on the particular nature of the hot climate (Hiernaux 1974; Hiernaux *et al.* 1975). Cold climate peoples may be tall and muscular or short and muscular, depending on the particular nature of the cold climate (Roberts 1953; Houghton 1991b). Stature is a variable that may be adjusted to improve the temperature homeostasis of either a linear or a muscular physique. Increasing the stature of muscular people *improves* the ratio of heat production tissue (muscle) to the heat-losing surface area. The physiological calculations show clearly that Polynesians are indeed best adapted to wet, wind-chill conditions. Later in this section it is questioned *"whether large muscular individuals would have been any better off than their smaller counterparts over long distance voyages."* Under the conditions defined, the big person is just in heat balance and the smaller is sliding quickly into hypothermia. This makes the difference between living and dying. That is what the calculations—which are central to the thesis, yet never are addressed by van Dijk—show.

Van Dijk continues, *"Houghton's hypothesis falters at this point, as it rests on the specific premise that the Polynesians were not obese. This assertion is false and is countered below"*.

The heat-balance thesis is not concerned with fat. If I have given the impression that it insists on Polynesians not being fat, then I have stated it poorly. What the heat-balance analysis claims to show is that fat is not necessary for survival of the large lean muscular person under wind-chill conditions in Oceania. The presence of fat can of course only assist survival in cold conditions, as I have indicated in the 1991 papers. But, as Keatinge (1969:

20) pointed out, fat "is probably to be regarded as little more than a fortunate benefit provided by a food store", and the thickness required for significant insulation is substantial. That may be one reason why cold-climate peoples tend to emphasise muscularity. I have also pointed out that measurements on recent non-westernised Polynesians do not show obesity. Obesity was discussed because it is a considerable problem in contemporary westernised Polynesians, and we are looking for clues as to the reasons for its existence. Van Dijk is correct about the high regard in which large people were/are held in Polynesian society, and in the later papers I have modified my incautious suggestion that "evidence of obesity is lacking in the historical record", but I would simply change it to "evidence of a *general* obesity is lacking...". My reading of the historical and ethnographic record is that obesity was largely confined to the upper levels of society, and a pervading obesity cannot be inferred from the contact record either of Polynesia or of maritime populations in Melanesia. It is particularly muscularity that dominates the descriptions of physique. I take it also that the record of obesity indicates mature societies, secure in control of their environments and food resources, and capable of supporting individuals who need do little physical work. One must also be cautious of the word 'corpulent' and its French and Spanish equivalents of two centuries or more ago; the meaning seems then to have indicated large body size rather than fatness specifically.

To repeat: the presence or absence of obesity is irrelevant to the heat-balance/selection thesis, which rests on overall body muscularity and its relationship to surface area.

The matters of limb proportions and head form are peripheral things and I will not spend time on them here.

GENETIC ANALYSIS

This is a substantial field, and it is not immediately relevant to the aim of the van Dijk paper. As I commented, "Where the ...DNA actually came from is rather immaterial in the physical (phenotypic) evolution of the pre-Polynesians and pre-Micronesians in Island Melanesia". However, I will touch on the matter. Firstly, much interpretation of their data by geneticists and molecular biologists is set against standard typological (Australoid/Mongoloid/ Melanesian) or linguistic (Austronesian/ non-Austronesian) models for Pacific settlement, because these are the ones prevalent in the literature. When the actual data are scrutinised, different interpretations are possible. One also notes the conflicting results from various genetic systems.

In summarising the results of some of these gene studies, Serjeantson and Hill (1989: 287) comment that "...the extreme view...that Polynesians evolved within Melanesia from a population resident there for at least 30,000 years, is untenable in the light of the genetic evidence. It seems quite implausible that a group evolving within Melanesia could have acquired, by chance, so many non-Melanesian genes! Rather, it seems likely that the Austronesian speakers were the source of those genes found commonly in Polynesia and sporadically in coastal New Guinea".

There is the old mix of problems here, with people being defined by language, and the typological Melanesian/Polynesian partitioning wherein Melanesia is seen as some discrete and distinctive biological entity. To say it all again, Melanesia is a geographic statement, and all commentators agree that its human populations are immensely varied. And at one time or another the ancestors of every person in Melanesia came out of Asia. Only one or two very tentative dates have yet been placed on the mutations shared between present-day

Polynesians and some Asians, and shared by some within Melanesia. The presence today in Asia and Polynesia of certain shared and distinctive genetic features does not preclude the subsequent continued evolution within Island Melanesia of human groups, bearing these markers, for many thousands of years before their spread into Remote Oceania. Those mutations unique to Melanesia and Polynesia demand a pause—just as do the changes in phenotype.

From nuclear DNA there is clear evidence for considerable genetic contact and—with mutation superimposed on mutation—considerable time depth of contact between the present peoples of Polynesia and of Island Melanesia. Put another way, the Polynesian genome is compatible with a long ancestral residence in Island Melanesia. The evidence *against* a long sojourn in Island Melanesia by the Polynesian ancestors seems, on scrutiny, to be that thus far the * α -globin IIa haplotype has not been found. This is negative evidence, on limited sampling, regarding events perhaps some 3000 or more years ago.

To balance the comments of Serjeantson and Hill, consider the conclusion of Ranford (1989: 188) from her studies of the complement system, published in the same volume. "The fact that the common alleles of the complement genes are the same in all the populations in the Pacific region means that these now seemingly varied groups have evolved from the same ancient genetic stock. There are, however, sufficient differences in the frequencies of these common genes between the populations of mainland Asia and the islands of the Pacific to suggest that they have been evolving separately for a very long time."

THE ANTHROPOMETRIC AND OSTEOLOGICAL EVIDENCE

"The most that can be reliably ascertained from these ratios is that Polynesians are unusually heavy for their height and surface area...." This does not make sense. Height, mass and surface area are interdependent variables, and it is not possible to be unusually heavy in relation to the other two. The Polynesian figures are not 'anomalous'; they simply lie at one end of the range for *Homo sapiens*. These indices are succinct expressions of the various parameters involved in body heat balance. In other groups they relate to climate, and, along with the other evidence, it seems reasonable similarly to consider them here.

AN ALTERNATIVE MODEL

Much of this section is a discussion of various possible influences—diet, disease, and social custom—on the phenotype of a group. The influence and interactions of diet, and endemic disease such as malaria, on growth are very important, but are also extremely complex. For example, a degree of malnutrition appears actually to mollify the effects of infection by the malarial parasite (Hendrikse 1987) and other studies suggest that treatment for malaria has little effect upon the usual patterns of growth (McGregor *et al.* 1968). The inhabitants of stable malarious areas, including women of child-bearing age, do appear to be well adapted to the parasite. Island Melanesia offers a good human biological laboratory for assessing variation in these factors. There are coastal groups in regions of endemic malaria, and there are upland groups largely free of malaria. On Ontong Java the introduction of malaria in recent times does not seem to have diminished the phenotype. In the 1991b paper I considered the influences of diet and disease against the extensive clinical and biological

evidence from the Harvard Biological Programme in the Solomon Islands (Friedlaender 1987) and the International Biological Programme study in Karkar Island (Hornabrook 1977) and could only conclude that they were not the dominant influences behind the varying body phenotypes of that region. Secular change also requires more scrutiny, but it is hard to confine change to only one aspect of overall environment and it seems that behind any changes still lie abiding differences in phenotype.

Regarding van Dijk's alternative model, it does seem that it requires extension to Micronesia, Fiji, and even the outer fringes of the Solomons: the early written records and a growing skeletal record (Houghton 1980; Roy 1989; Visser 1991) give evidence of large muscular people in all these parts, with some dates back to 2000 B.P. Ubiquitous customs of force-feeding and selective breeding in island group after island group over the vast expanse of Remote Oceania in prehistory seems an improbable explanation for the impressive physiques of the people, and particularly their muscularity. It would be an achievement in eugenics beyond anything Galton envisaged, and anyway, eugenics programmes do not work well with humans. However, such customs as van Dijk describes seem fair explanation for the perpetuation of the particularly impressive physiques of the aristocratic lineages of the established Polynesian chiefdoms and perhaps, to a limited extent, some of the commoners. (As a speculative aside, could this regard for size reflect an awareness that herein lay the essence of survival? By contrast, the Sherpa people of the Himalaya regard large bulky people as a joke, ill-matched to the terrain.)

I come back to the interesting fact that Polynesians seem to run to fat readily. The contact record also suggests this might have been the situation in Micronesia. These are matters of considerable significance for contemporary health. For some time we have been trying to puzzle out a possible link between the evolutionary forces that have determined the human frame in Remote Oceania, and the problem of obesity, and we now have an hypothesis which we are testing. There are two types of fibre in skeletal muscle, termed Type I and Type II. Two papers (Staron *et al.* 1984; Wade *et al.* 1990) have established a significant relationship between a preponderance of Type II muscle fibre and obesity, in a European sample. Note that muscle is the primary factor in this finding. It seems possible that Polynesians, with their environmental selection for muscle for warmth, may well show a great preponderance of Type II fibre. We are now proceeding with an appropriate series of muscle biopsies to test this possibility. I find it exciting that research into the rather arcane matter of origins and evolution of Pacific peoples may prove helpful in throwing light on a major contemporary health problem.

Returning to the van Dijk paper: there are other misunderstandings and misinterpretations on biological matters, but I will touch on only a couple more. Towards the end of the paper van Dijk states that "*The major aim of this article is to point out that the observation that larger people survive longer in cold water than small ones, does not constitute proof that the Polynesians are adapted to cold*". That this is the major aim is surprising in light of the sub-title of the paper, because the analyses I have made regarding the influence of environment on body form in the Pacific have had to do with wind-chill. Immersion in water is a rather different physiological problem from that of wind-chill, and has not to my knowledge been studied in relation to Pacific physiques. Again: "*the comparatively short leg length in Polynesians is purely an allometric factor, resulting from their Asian origin...*". Allometry may be succinctly defined as change in shape (i.e., proportions) with change in size. If Polynesian body proportions are the same as those of many Asian peoples then this cannot be allometry. And so on.

SUMMARY

The van Dijk paper has three aspects. One is a presentation of matters of local custom, diet and disease, particularly within Polynesia. Various influences on phenotype are mentioned. The major ones, relating to diet and disease, were not covered in my 1990 paper but have been taken into consideration in those of 1991. However, the extent of their influence on phenotype has yet to be fully determined. I suggest that the weight of the present evidence shows them, along with social custom, not to be primary. The second aspect of the van Dijk paper is the raising of issues of general interest and debate, such as taxonomy by multivariate statistics, interpretation of gene data, and so on. Here the author takes an 'orthodox' view, for which she will have plenty of support. These are matters that need more debate than is possible here, and it will be some time before consensus is reached. The third aspect is the 'critique', an attempt at an interpretation of the biological factors underlying body temperature homeostasis. For this aspect, at least, the fairy-tale title is apt.

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