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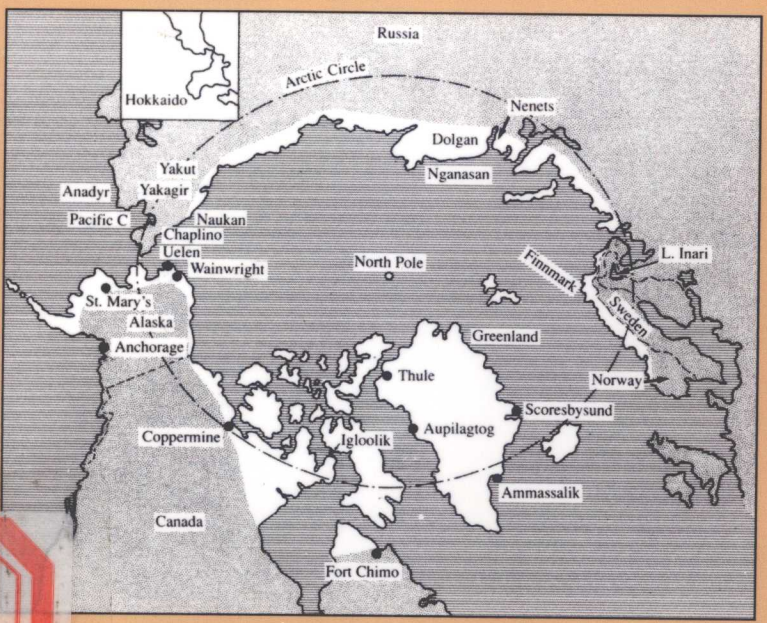
Evidence from circumpolar peoples

ROY J. SHEPHARD &
ANDRIS RODE



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What are the health consequences of a transition from an active 'hunter–gatherer' lifestyle to that of sedentary modern living? In this book, the impact of 'modernization' is assessed in various populations in the circumpolar regions. The hazards of living in polar regions, and the adaptations shown culturally, behaviourally and physically by the indigenous peoples are examined and the effect of changes in habitual activity, diet, and general lifestyle due to more urban living patterns on the body composition, pulmonary function and susceptibility to disease is discussed. The implications of this switch are important not only for all those concerned about the survival of indigenous communities around the world, but for all of us living increasingly sedentary, urban lives.

Anthropologists, physiologists and those interested in population fitness will find this a comprehensive and valuable volume.

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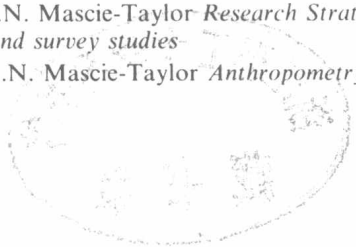

Preface

Many 'modern' industrial countries have experienced major epidemics of disorders such as atherosclerotic heart disease, hypertension, diabetes, and various forms of cancer during the past few decades. Among other hypotheses, a departure from the traditional human lifestyle has been suggested as a primary factor precipitating such epidemics. After many centuries of successful human adaptation to the diet and physical demands of life as a hunter–gatherer or a low technology agriculturalist, there has been a dramatic and rapid concentration of the world's population in large conurbations where there is little possibility to sustain either a traditional diet or historic patterns of physical activity. The energy demands of city life have decreased progressively as developed countries have experienced widespread use of cars, automation of factories, mechanization of the home, and easy access to sedentary forms of entertainment such as television, video-films and computer games. A combination of store purchases and increasing affluence has shifted food consumption from traditional 'country' foods such as grains and vegetables to refined carbohydrates, saturated animal fat and protein. Medical advances have increased human lifespan, but at the same time advertising and other social pressures have encouraged a large fraction of 'modern' populations to become addicted to tobacco and other drugs.

Given the wide discrepancy between our current lifestyle and that appropriate to the evolutionary roots of our human species, adverse health consequences are hardly surprising. Unfortunately, technology was not available to document the physical condition of city-dwellers before the disturbance of their lifestyle began, and our knowledge of the effect of 'modernization' upon current health is correspondingly incomplete. However, the studies of indigenous populations that were carried out by the International Biological Programme Human Adaptability Project (IBP-HAP) in the mid and late 1960s provide a unique benchmark, allowing us to trace within these populations both the social processes of acculturation to urban life and the resulting consequences for health. The pace of change has varied from settlement to settlement, but in many instances the

populations concerned have moved from a near neolithic technology to the lifestyle, social habits and behaviours of the late-twentieth-century city-dweller over the course of two or three decades.

One set of traditional communities that the International Biological Programme (IBP) studied in particular depth were the various small settlements that had adapted successfully to the environmental challenges of the circumpolar habitat. When these populations were first examined, some of them had been affected but little by modern innovations. However, over the last 20–30 years, almost all of these groups have adopted a pattern of life that in many respects mirrors that of the 'modern' city-dweller. Sequential study of these settlements has thus allowed the biological anthropologist to document, albeit on an accelerated scale, the likely health consequences of a transition from a traditional to an urban, post-industrial type of civilization.

Our story moves broadly over the panorama of the circumpolar peoples, as they have undergone this process of 'acculturation', although it draws particularly upon the experience of our own research group in Igloolik (North-West Territories of Canada, soon to be the independent territory of Nunavut) and Volochanka (Northern Siberia). We begin with a brief account of the origins, traditional social customs, nutrition, and lifestyle of the several distinct indigenous circumpolar groups, noting early research findings on their respective levels of health and fitness. The concept, scope and methodology of the International Biological Programme is then examined, with particular reference to the human adaptability project and its studies of circumpolar communities. Subsequent chapters look at changes in the factors which affect the ability of the circumpolar peoples to adapt to what remains a very challenging habitat: altered social structures and behaviour patterns, secular trends in diet, metabolism and body composition, changes in physical fitness and cold tolerance, alterations of lung function, smoking habits and the prevalence of respiratory disease, patterns of growth and development, and current health status. The concluding chapter examines broader social implications of the data. It is argued that the findings have relevance for indigenous populations in many parts of the world (where, in some instances, the 'white' city-dweller's worst mistakes of lifestyle still can be avoided). There are also useful lessons for health professionals in major conurbations, as they devise appropriate tactics to counter the sedentary habits imposed by our affluent society. Finally, the data have practical importance to a growing segment of city-dwellers who visit the far north during the winter months, as this geographic region becomes integrated into our global economy.

In presenting this monograph, it is important that we acknowledge the

contribution of the indigenous populations concerned. They have not only given freely of their time, but have been willing to share with us and other investigators their profound understanding of the north and its challenges. We also much appreciate the financial and logistic support of Health and Welfare Canada, Indian and Northern Affairs, Canada, and more recently of Canadian Tire Acceptance Ltd. Without the continued generous help of these organizations, our component of this research could not have been completed.

Roy J. Shephard and Andris Rode
Toronto, 1995

Contents

1 *The circumpolar habitat and its peoples: traditional lifestyle and early research findings*

The circumpolar habitat

Boundaries

The circumpolar region is defined by climate and culture, rather than by a specific latitude such as the Arctic circle. Geographic and climatic markers include the tree line, the zone of perennially frozen ground that even in summer only thaws superficially (the permafrost), and the mean July isotherm of 10 °C (Bone, 1992; Burch, 1986; Damas, 1984; Kimble & Good, 1954; Péwé, 1966; Wenzel, 1991). These various boundaries have shifted markedly over the past 10–20 millenia (Lamb, 1965). During the last Pleistocene period of glaciation, ice covered much of North America, Europe and Asia.

The cultural criterion of the circumpolar habitat, at least in North America, has traditionally been the region exploited by a people that early investigators, ourselves included, sometimes termed Eskimos (Damas, 1984). 'Inuk' ('Inuuk,' two, three or more 'Inuit') is the descriptor currently preferred, at least by the Canadian segment of this population. Also, some Amerindian groups can be found living within the geographic boundaries of the circumpolar region even in North America.

Climate

Throughout the circumpolar territories, the temperature remains below freezing for much of the year, and in some of the colder settlements of the eastern Canadian arctic mean daily air temperatures as low as −50 to −60 °C are recorded during the winter months. The average windspeed is about 5 m/s (18 km/h), but windspeeds of 10 m/s (36 km/h) and higher are encountered on some days, and then the windchill is particularly severe (Landsberg, 1970). In contrast, the 24 hour sunshine of late June and early July can occasionally bring mean daily temperatures as high as 25 °C.

In part because the low winter temperatures give a very low absolute

humidity, precipitation is light in most of the circumpolar region. The typical winter snow cover ranges from 0.1 to 0.4 m. Nevertheless, in the early part of winter, high winds lead to an almost continual movement of the snow, with drifting and frequent 'white-outs', blizzards when blowing snow reduces visibility almost to zero. In the islands of the high arctic, pack ice offers a further hazard to shipping for most of the year, but at lower latitudes the ice melts in late June, and here the coastal settlements can be supplied by boat for several of the summer months (Bone, 1992; Stager & McSkimming, 1984).

The local climate is influenced by the extent of snow and ice cover. The snow and ice reflect incident solar radiation and thus reduce potential heating of the ground surface by as much as 80%. Other modulating factors include the proximity of open water, air and water currents and altitude. There are some quite high mountain ranges in the circumpolar territories; air temperatures decrease by 6–7 °C per 1000 m of altitude, and wind exposure is also greater in mountainous regions. In consequence of these several variables, the climate at a given latitude is much colder in the east than in the western Canadian arctic (Fig. 1.1). Likewise, the tempering influence of the Gulf Stream gives ice-free water along the coastline of south-western Greenland and Scandinavia for much of the year.

Geography and economic resources

The climatic and geographic characteristics of the region have had important economic implications for humans who have wished to colonize the circumpolar habitat.

For several months of the year, all outdoor work must be performed under conditions where it is difficult for humans to sustain heat balance. There is partial or total darkness, and visibility is further restricted by blowing snow. Once the tundra is firmly frozen, with light snow cover, travel by dog or reindeer sled or snowmobile is generally possible, but in the more southerly wooded areas or taiga, accumulations of soft snow impede winter travel by all means except snowshoes. During the summer months, much of the region becomes a treacherous swamp of permafrost that can only be explored by boat, plane, or hover-craft.

The soil is thin, poor and dry over much of the arctic. In the more southerly settlements, sparse herbs, moss, lichens, grasses, sages and even small willow shrubs emerge from the snow during the spring, but in the more northerly regions a terrain of gravel and rock is devoid of vegetation. The main potential sources of local ('country') food are hunting, trapping and fishing, although some communities have also learned the arts of

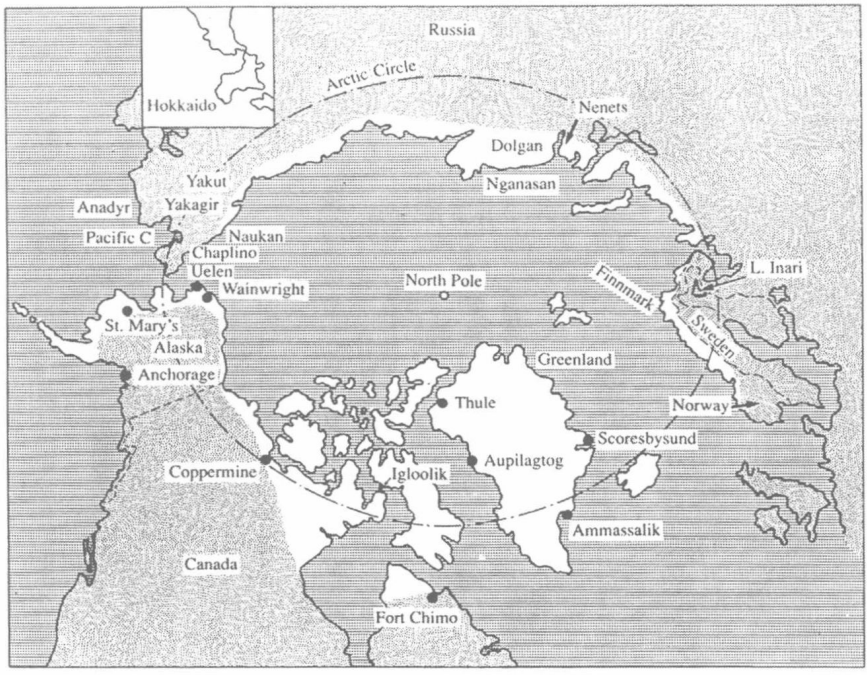

Fig. 1.1. Circumpolar regions, as defined by treeline. Unshaded land mass is devoid of trees. Arctic polar projection.

herding caribou (reindeer), foraging for berries and growing root vegetables. Many areas of the tundra such as Northern Québec still have large herds of wild caribou, but in other locations a sparse fauna and flora have caused animals and their pursuers to range over vast distances. Available species (Freeman, 1984) include various large mammals (seals, whales, walruses, bears and musk-oxen), smaller mammals that are prized mainly for their furs (wolves, arctic foxes and hares), birds (ptarmigan, ducks and geese) and fish (particularly arctic char and lake trout). A combination of local ground conditions and seasonal variations in the quality of the pelts has favoured the hunting of different species at different times of the year (Shephard, 1978; Fig. 1.2), to the extent that some Inuit communities have named the various months in terms of the hunting opportunities that they offer.

Most parts of the arctic give little scope for the growing of vegetables, even during that short period of the year when there are 24 hours of daylight, but some communities have had success in cultivated root crops, particularly potatoes. Some groups also gather berries, roots and mushrooms

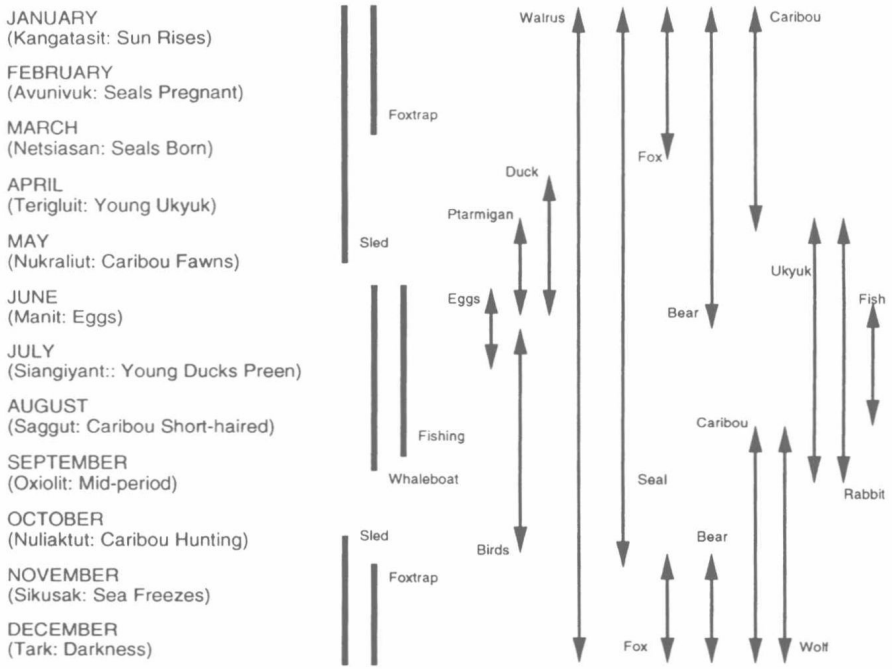

Fig. 1.2. Inuit names of months of year, with hunting equipment used (solid bars) and game sought (arrows). Source: Godin & Shephard (1973a).

by foraging during the summer months. Nevertheless, until recently it has been necessary for the indigenous population in most parts of the arctic to obtain much of their normal vitamin C requirement from sources other than typical vegetables, including plankton found in the stomachs of raw fish, raw meat, blood ('blood soup') and the stomach contents of the walrus and the caribou.

The local fauna contributed to the circumpolar economy in other important ways. The skin, bones, intestines and membranes of animals such as the caribou and the seal once provided the indigenous peoples with raw materials for the fabrication of clothing, footwear and tents, plus a variety of domestic and hunting implements. As contacts with 'white civilization' developed, a trade in animal pelts progressively provided local residents with a cash or barter income for the purchase of both manufactured goods (including modern hunting weapons, domestic implements, twine and thread) and food (as during the failure of the Canadian caribou migrations in the period 1915–1924).

Communities living above the tree-line could not derive heat from the

combustion of timber (except in coastal settlements, where there was the occasional and unpredictable bonus of finding driftwood or wreckage from shipping). Adaptation to the harsh winter environment thus depended to some extent upon physiological mechanisms, but was based largely upon the development of clothing that provided good insulation during outdoor activities (Renbourn, 1972), and the design of very effective snow shelters (the igloo and the quarngmaq or sod-house). The snow shelters allowed the accumulation of heat from both body metabolism and traditional oil lamps. During the summer months, a change in prime hunting locations and a substantial increase of ambient temperatures led families to adopt differing tactics for both their clothing and their overnight accommodation (for example, the eastern arctic Inuit established temporary tent camps near the floe edge to facilitate the hunting of sea mammals).

The 'cold war' of the 1950s led to the establishment of a chain of radar stations across the North American arctic (the 'DEW' line), with a substantial influx of 'white' immigrants. Airstrips developed at some of these stations were adequate to accommodate large cargo planes and jet aircraft. A more detailed exploration of mineral resources now became possible. Some parts of the arctic proved to have extensive reserves of oil (for example, the Alaskan north shore) and/or minerals (for example, the lead, zinc and silver deposits at Nanisivik, near Arctic Bay, and the uranium found at Baker Lake). Economic exploitation of such resources by southern entrepreneurs has progressed relatively slowly, in part because of the need to resolve the land claims of the indigenous populations, and in part because of a continuing search for industrial technologies that can withstand the rigours of the arctic winter.

The circumpolar peoples and their origins

Before extensive contacts with 'white civilization' had developed (1750–1800), the total number of inhabitants of the circumpolar belt of the northern hemisphere was thought to be about 48 000 people (Milan, 1980).

Rychkov & Sheremet'eva (1980) identified 16 groups indigenous to the arctic. Some of these populations currently inhabit Central Siberia (the Evenki, nGanasan and Dolgans) and North-Eastern Asia (the Yu'pik Inuit, Chukchi and other smaller indigenous groups of the Chukotka region, Vahtkin, 1992). Larger numbers of the indigenous circumpolar peoples are found in North America and in Greenland (Amerindians, Aleut and Inuit). Other circumpolar groups which have been studied by the International Biological Programme include the Ainu living in the northern