Con: All Dwellers at High Altitude Are Persons of Impaired Physical and Mental Powers: The View from the Himalayas

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AT THE OUTSET, I WISH TO EMPHASIZE that I do not think that Barcroft was a racist. The statement (All dwellers at high altitude are persons of impaired physical and mental powers) was based on scientific work that he and his team performed in Cerro de Pasco in 1921–1922, and earlier on Monte Rosa and in Tenerife, as well as the work of other scientists. It was empirical work (Barcroft, 1925) with flawed conclusions.

Barcroft may have been a smart scientist, but clearly he lacked street smarts. He should have learnt from the canny Jesuits (who came to the Peruvian Andes several centuries before him), such as Father Acosta who was the first to document the possible mechanism of acute mountain sickness in the sixteen hundreds. The Jesuits did not make reckless statements like Barcroft. (Incidentally, the name Jesuit is derived from one given to intrigue and equivocation). I am not suggesting that Barcroft should have been “Jesuitical,” but he certainly should have minded his words. Barcroft was a leading high altitude physiologist of his day, who worked extensively on the hemoglobin oxygen dissociation curve. Barcroft challenged Haldane who maintained till the end that oxygen is secreted into the lungs; but, contrary to such achievements like correctly challenging Haldane, his appreciation of certain aspects of the physiology of man at high altitude was clearly deficient. Even if he incorrectly assessed that the South American man was lacking in mental and physical abilities, Barcroft’s knowledge of geography seems to be limited. In making that statement (*all dwellers at high altitude—*), he ignored the people living in the Tibetan plateau. As a true scientist, he should have abstained from making sweeping statements when he did not have all the evidence.

Perhaps if he had read a bestseller of his time (James Hilton’s *The Lost Horizon*, published in 1933), which details the life of Hugh Conway after a plane crash in the Himalayas, Barcroft could have had a re-think of his earlier statements. In that story, living in a magnificent location at high altitude makes you energetic and young forever (hence the term Shangri la or earthly paradise, which is derived from the book). Hardly the environment that would breed mentally or physically challenged people. Granted, the story is fictitious, but it is powerful. The book was made into a popular movie in

1937 by Frank Capra. Perhaps Barcroft should have seen that movie if he was not given to reading for fun. However I digress too much; now for some anecdotal evidence before more concrete proof will be presented.

The Sherpa people, who have a Tibetan ancestry, are some of the smartest people I know. For example, Dr. Sanduk Ruit, the world renowned ophthalmologist, has revolutionized eye surgery in Nepal, Bhutan, Tibet, Mongolia, Burma, and so forth. Just ask the Harvard-educated Dr. Geoff Tabin from the University of Utah who works closely with Ruit. Geoff is in absolute awe of the eye surgery skills that Sanduk possesses. In addition, the present Director of Health Services in Nepal is Dr. Mingma Sherpa. He is in charge of all health-related government activities in Nepal. For decades he looked after the hospital in Phaplu in the Everest region. Both of these people were born and bred at high altitude and clearly contradict Barcroft’s assessment of highlanders. Many other examples abound.

Finally, to more concrete evidence to disprove Barcroft’s ill-conceived statements. In an article entitled, “Are Himalayan Sherpas better protected against brain damage associated with extreme altitude climbs?” published by Garrido et al. in 1996, they compared seven well-known Sherpa climbers that lived in high altitude with 21 lowland elite high altitude climbers. They found that, while all the lowland climbers presented psychoneurological symptoms during or after the expedition and 13 (61%) showed magnetic resonance abnormalities (mild cortical atrophy and/or periventricular high intensity signal areas in the white matter), only one Sherpa (14%) showed similar changes on the scan. The significant differences in both clinical and neuroimaging findings would seem to suggest that Sherpa highlanders have better brain protection even when exposed to extreme altitude, much higher than their areas of residence (around 3000 to 4000 m). (Of course there were no scans during Barcroft’s time, so it is hard to fault him for not carrying out these tests). But we can say that he did speak out prematurely.

The next evidence I have is the unpublished article by Beall, Fagan, and Goldstein based on a test that measured cognitive function in Tibetan nomads. Joe Fagan is a psychologist well-known for developing the Fagan Test for Infantile Intelligence that is now extended for use across the lifespan. It measures

learning and information processing ability. In addition to its power of prediction of future academic success, it is culture fair, that is, it is not influenced by past experience or language or schooling; in fact it is a very useful test to assess the intelligence of the Tibetan nomads. The study population was a community of pastoral nomads living in Namring County, Xigatse Prefecture of the Tibetan Autonomous Region, China at 4850 to 5450 m. These nomads lived in base camp of 2 to 9 households and subsisted on products obtained directly from their herd or trade through animal products. The researchers studied a total of 120 healthy, nonpregnant Tibetan nomads from 5 to 73 years old in that high altitude community. Central nervous system functioning was measured with a test of information processing based on selective attention to visual novelty. Hypoxia was measured in terms of percent of oxygen saturation of arterial hemoglobin. Compared with normal sea level residents, the nomads were profoundly hypoxic as indicated by a mean percent of oxygen saturation of arterial hemoglobin of 82%. However, the nomads had normal central nervous system functioning as indicated by a mean visual novelty score of 64% comparable to a sea level population in Cleveland, Ohio, USA, where the mean score was 60%, suggesting clearly normal cognitive function in these nomads probably brought on by physiological adaptations over thousands of years despite the high altitude hypoxic environment. These adaptations could be genetic, leading to better vascular, neuronal, and other physiological changes in the brain. The findings of this unpublished data are entirely in keeping with normal magnetic resonance imaging of the brain of Sherpas described above (Garrido et al., 1996), the normal cerebral blood flow response to exercise in Tibetans (Huang et al., 1992), and normal brain glucose metabolism in the Tibetan population (Hochachka et al., 1996).

In terms of physical powers of these people from the Tibetan plateau, we need hardly say anything to bolster our case. If Barcroft had been a very adventurous sort and made a trip to the Himalayas, he would surely not have dared to put down impairment of physical powers in these people even if he were biased about their cognitive capabilities. For example, consider the current Everest speed record held by a Sherpa, Pemba Dorjie, who reached the top of Everest (8848 m) from base camp (5300 m) at the incredible speed of 8 hours and 10 minutes in 2004. Or consider Babu Chiri Sherpa from the village of Taksindu in Solukhumbu, Nepal, who stayed at the inhospitable environment of the summit of Everest for 21 hours when most climbers just want to descend quickly. Better physiological adaptations in these Sherpa highlanders,

such as a lower degree of hypoxic pulmonary vasoconstriction leading to lesser predisposition to high altitude pulmonary edema, may be a factor. Even the great Mallory (as is noted in his diary) wondered how the Sherpas carrying such heavy loads easily outpaced him while trekking into base camp of Mount Everest.

In conclusion, Barcroft made a careless and potentially inflammatory statement based on his data at that time. With access to more comprehensive research, he probably would be eager to revise that statement if he were living today.

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