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1 **Inequality: The Dangers of Meat Haves and Have-Nots in a** 2 **Nicotinamide-adenine-dinucleotide World.**

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8 **Abstract**

9 Our evolution and recent history can be seen as a “World Hunt” for meat
10 as part of an omnivorous diet. Meat contains key micronutrients namely
11 Nicotinamide (vitamin B3) and methyl-donors with deficits causing pellagra, an
12 archetypal disease of poverty. Inequality is a leading ultimate risk factor invoked in
13 the aetiology of common diseases let alone threats from climate change and
14 pandemic triggered catastrophes. We hypothesize that the origin of inequality was
15 our evolutionary and nutritional move from equal to unequal sharing of the meat
16 supply some 10-20 thousand years ago. High meat intake may have bioengineered
17 powerful ruling classes and lower intake the proletariat with higher fertility, but
18 inferior (brain) health. A fairer quantity of a safer meat intake in future should
19 moderate global variances of fertility, height, health, and prosperity. Death rates
20 of acute infections including emergent zoonoses (such as COVID-19) and chronic
21 infections (such as TB) should fall as might the incidence of some diseases of
22 affluence. Meat justice by improving human capital could make redundant
23 superficial markers, such as skin colour, used to discriminate against peoples and
24 heal a divided world.

25 **Key words: Disease Transitions; Demographic transitions;**
26 **Anthropocene; Nicotinamide; COVID-19; ACE2 receptor; Tryptophan;**
27 **Multiple sclerosis; Tuberculosis.**

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36 **Introduction**

37 Prelapsarian human nature was egalitarian sharing animal products that are the
38 main sources of nicotinamide, tryptophan and methyl-donors. The origin of
39 inequality was in the Mesolithic with unequal sharing of meat creating phenotypic
40 variety in a genetically homogeneous population (genomes were later modified by
41 nutrition and infection^[1]). A high meat intake allowed for a ruling intellectual
42 class and a lower intake a worker class with higher fertility but poorer health. Meat
43 intake currently manages hundredfold variances within a global annual 300
44 million metric tonnes (was 7 million in 1960 and could rise another 75% by 2050).

45 Meat inequality is high and for billions their slice of the “meat-loaf” is wafer-thin
46 undoubtedly affecting their well-being. Wells (2016) threw down the gauntlet:
47 **“If we cannot define the link between nutrition and power we will**
48 **never gain the power to resolve global malnutrition and its numerous**
49 **costs”.**

50 **Extreme Meat Inequality: The Forgotten case of Pellagra**

51 Indeed inequality is generally held to be the pernicious culprit responsible for
52 many medical and social ills faced by food-insecure billions that can lead to trade-
53 offs between survival with high fertility but poorer health and shorter lives [2, 3] [4, 5].
54 [6, 7]. As defined by Bellamy(1897) the basis of equality is when “**...there are no**
55 **more a-hungered”.**

56 An iconic examples of a nutritional trap is when a low meat intake risks the
57 degenerative condition pellagra whose sufferers, with inferior cognitive and social
58 intelligence, were ostracised as the “Butterfly caste”, and contracted infections
59 such as tuberculosis (TB) also closely linked with poverty^[8, 9]. Terms used to
60 stigmatize, shame, blame and pillory pellagrins are still in common usage today to
61 keep the poor in their place. Worse was the call for forced sterilization based on
62 eugenic and racist policies building on the “myth of the lazy native”. Yet there
63 turned out to be a biological and trans-generational explanation for this man-
64 made layer of destitution preventable by public health means.

65 **A Desire for Meat**

66 Nutritional traps drive a “flight to quality”, as noted by Ernst Engel in the 19th
67 Century^[10]. As the price of bread falls or when incomes rise people spend less on
68 starches but more on meat up to a point. This gastronomic desire extends to
69 cannibalism documented in the Magdalen (30,000 years ago) as funerary
70 defleshing and later ritualised by states short of meat in Central America or, as
71 infanticide or witch-hunting ^[11, 12]. Cannibalism has proponents for a “materialist”
72 theory and the need for protein but it is also a symbol of “savagery” giving many
73 an excuse for racism, slavery and “civilising” colonialism^[13]. In retaliation the
74 cattle-based original capitalism and its descendant expropriations of land and
75 nature has been convincingly called “cannibal capitalism”.

76 Rich Americans eat more than their body weight in meat every year whilst many in
77 the “Global South” are on negligible amounts. Developed countries are not
78 immune as their poor, often children and minorities, fall below “Eat Well Plates”
79 as witnessed by the rise of food banks and the recognition of place based food
80 deserts where good food is unavailable creating (obesogenic)socio-ecological
81 environments that argue against neoliberal paternalistic views on the incompetent
82 poor having “mismanaged lives” that need to be disciplined or shamed,
83 stereotyped as “chavs” and stigmatized as “body fascism” or politicized by
84 neoliberals as “deplorables”, as were pellagrins in their pathological NAD-deficient
85 food-scape in “Foucaultian” fields of lost-power and little choice. More
86 geographical meat transitions are still occurring though again not everywhere: in
87 1962 the average Chinese was eating 4kg pa but now that figure is 60kg pa and

88 rising fast towards the American average of 120kg pa. 10 calories of animal feed
89 produce 1 calorie of meat and need enormous quantities water, oil, fertilizers,
90 pesticides, and antibiotics let alone consumption risking dangers from food
91 poisoning and zoonoses with human and economic costs. [14, 15] Given all that, and
92 given animal rights abuses and that meat producers are high contributors to
93 global greenhouse emissions, one would hope that there is a sound biological
94 demand rather than a higher supply on the market or “showing off” .

95 **Demography and Subsistence are Key considerations**

96 Modes of subsistence and demography are the place to start a quest for the source
97 of inequality^[16, 17]. Malthus noted that poor parishioners reliant on cereals had
98 high rates of baptisms relative to burials sparking concern that their high fertility
99 led to cycles of deprivation^[18, 19]. He commented on the sparse numbers of the
100 more carnivorous hunter-gatherers and that population densities increased
101 exponentially with cereal based agriculture. Conversely Boserup suggested
102 population pressure increased agricultural innovation to cope and De Castro’s
103 “Geography of Hunger” (1952) pointed out reverse causation was at play in that
104 global epidemiological and experimental data suggested that a degree of
105 malnutrition increases fertility and quotes Doubleday’s “True Law of Population”
106 (1853) on high meat intake decreasing fertility.

107 Fertility may have a “U” shaped relationship with meat intake. Low nicotinamide
108 in diet leads to its synthesis “in house” from the degradation of tryptophan. This
109 pathway is an “immune tolerance” mechanism that can welcome foreign antigens
110 such as the foetus or symbionts , but risks dysbiotic and acute infections - and may
111 switch to immune intolerance as the nicotinamide dose increases [13, 14].
112 Teleologically this allows “baby booms” as diet improves when emerging from
113 famines and for slight changes in fertility compounded over generations to alter
114 trajectories from extinction to strong growth and shifts toward quality over
115 quantity of offspring^[20, 21]. Disease inequality could derive from subpar meat
116 intake and nicotinamide related biochemical and epigenetic mechanisms to affect
117 “human capital” with other life-history trade-offs and dietary mismatches over
118 lifetimes then forming the developmental origins of adult disease (DOHaD) and
119 late-life and transgenerational inequality^[22, 23]. Current demographic and disease
120 correlations with various factors, such as education, may be hiding a “lurking”
121 variable of food, particularly meat, resource; this systemic dietary inequality was
122 not present in our “deep” history. [24, 25]

123 **Meat and Brains: “Planet of the Apes”**

124 Primordial pecking orders with dominant alpha males or females were more over
125 access to mates. At the time of the “Great Divorce” *Homo* increased meat intake,
126 sourced on the savannah, became reproductively isolated (“kissing cousins” on
127 forest edges excepted) and at a fork in the road speciated ^[26, 27]. **Figure 1.**

128 **Food and Fortune**

129 Trans-continental food quests with the prosocial and technological skills for
130 hunting catalysed the NAD(H) based energy rise required for high general
131 intelligence in positive feed-back loops [28, 29]. **Figure 2.** Hunting parties crossed
132 the globe extirpating animal, bird, fish, or sea-mammal species in their wake.

133 *Homo sapiens* and Neanderthals independently evolved large brains on high meat
134 diets but both species were “thin on the ground” with populations that “tottered”
135 with local extinctions and population bottle-necks that led to the exponential
136 expansion and cultural flowering of one but the simultaneous extinction of the
137 other^[30, 31]. *Homo sapiens* honed in on the difficult to digest and toxic plant foods
138 detoxified by cooking and xenobiotic enzymes in a cultural and genetic co-
139 evolutionary approach^[32, 33]. This move down the food chain along with pro-
140 fertility cultural innovations, exemplified by cosmetic ornamentation and
141 seductive figurines, perhaps rescued us from extinction [34, 35].

142 **At Human Evolution’s Heart was Meat-centred Equality.**

143 Hunter-gatherer social norms were egalitarian sharing meat with kin and non-kin,
144 at least within the reproductive in-group. Land was then a shared “commons”.
145 Social animals fight for the spoils even when by-standers - so this was our “social
146 leap”. Leaders only existed for time limited tasks. “Stag Hunt” and “Ultimatum”
147 games demonstrate a residual sense of fair play in contrast to the misanthropic
148 “Homo economicus” depicted in the “Tragedy of the Commons” [36, 37]. This
149 redistributive system created the most long lived economy in our history and was
150 the dietary evolutionary environment to which we adapted [38]. Adaptations have
151 occurred since (such as lactase persistence) but a mismatch with this
152 “Palaeolithic” diet may still be relevant to modern day illnesses - particularly for
153 the poor or the post-reproductive who are of an age when selective pressures to
154 adapt are attenuated implying that their metabolism, in particular, would
155 perform better on the long-abandoned ancestral diet^[39, 40].

156 **A more Variable Subsistence Package developed.**

157 Horticulture emerged in the Mesolithic in marshlands and uplands. Communal
158 village “nests” allowed storage, helped by pottery, and pans for vegetable and
159 meat stews [41, 42] and veneration of fertility and diet - later examples were Ceres,
160 Maize, and Bull cults^[43]. A sexual selection process included language, dance,
161 laughter and cooking domesticated and “civilized” us encouraging our
162 reproduction and controlling the reproduction of domesticates^[44].

163 **The “Great Disequalization”: Outer Walls Inner Castes.**

164 There was a lag of some 5000 years between gardening and Neolithic agriculture
165 and aquaculture that started in arid zones between rivers suitable for irrigation or
166 flood-retreat alluvial zones. Another long gap exists before city and national walls.
167 Walls kept out pastoralist egalitarian barbarians and their meat surpluses traded
168 or raided for grain - and kept in a populace with their cereal surpluses that could
169 be taxed by rulers [45]. Cities record social stratification with kings, priests and
170 military elites feasting on quality foods and waging wars over meat

171 resources. Nobles were taller and healthier and better educated as a “cognitive
172 class” not unlike our well-fed “meritocracies”^[46, 47]. This disequalization event
173 perhaps started earlier in a mosaic such as in the sedentary Nafutian culture but
174 wherever it occurred a relative shortage of meat fits the facts well: inequality even
175 developed in non-agricultural communities who needed technological advances
176 such as ocean-going canoes or horses to hunt new sources of meat as it ran out^[48].

177 Much has been made of class differentiation in Eurasia being more over the quality
178 of food but over the quantity of food in Africa however if meat is the crucial factor,
179 and manners, spices and sensuality more superficial, this paradox disappears as
180 meat was more of a luxury in equatorial Africa^[49, 44]. The importance of meat is
181 shown by cattle as capital with transfers in “bride-wealth” dowries and as a
182 universal central-dish in feasts^[50]. Crucial determinants of inequality were
183 ownership of land and livestock that could be inherited with Gini coefficients as
184 low as .25 for foraging hunter-gatherers compared to .5 amongst agriculturalists.

185 **Stocks and Trade: An overdue Tribute to “Barbarians”.**

186 Savvy pastoralists at independent sites developed dairy that as a source of
187 nicotinamide riboside could explain the convergent genetic evolution of lactose
188 tolerance and the cultural evolution of fermented yogurts and cheeses ^[51, 52].
189 Steppe peoples and their ideas spread across Europe around 2500 BCE, replacing
190 or amalgamating with agriculturalists as did later mounted pastoralists^[53, 54]. The
191 fall of the Roman Empire on a diet of “bread and circuses” and many pandemics
192 allowed Germanic pastoralists with their pedigreed animal husbandry to
193 overwhelm a cereal dependant system (with its “agri deserti”) and Roman
194 deserters^[55].

195 **See-Saw Cerealization: Meet thy Maker and Breaker**

196 A Green revolution around 1000 AD with unification of African and Asian crops
197 now with rotations and multiple planting seasons during a warm medieval period
198 allowed further “Cerealization and Calorie-ization”. The social gulf between meat-
199 eaters and grain-eaters was a cultural fact of life with social penalties for
200 transgressors^[56, 57]. Populations boomed then busted with the Black Death^[58] then
201 recovered slowly on the higher meat diet available to the survivors whose better
202 human capital may explain the rise of Europe.

203 **Old and New Worlds: All Things (NAD) were Not Equal.**

204 American megafauna, as in Australia, had, unlike the “Old World” no prior
205 experience of resisting human predators leading to their easy extinction as the
206 hunters arrived 10-15 thousand years ago. The New World thus had less animals
207 and were unlucky with their limited choice of domesticates, given no sheep, goats
208 or cattle. Comparison between Old World social structures and the New World
209 shows that the latter were the less stratified with less inherited wealth^[59]. Old
210 Babylonia yields a Gini of .40 whereas near contemporaneous Teotihuacan scores
211 a low Gini of .12. Similar observations were made in China with its low level

212 stratification and pigs but no draft animal's supports availability of "food on the
213 hoof" as the driver rather than animal labour. This all suggests a "U" shaped curve
214 with high and low meat intakes favouring egalitarianism and collectivism but
215 somewhat constrained meat supplies leading to stratification. (Later in North
216 America an abundant meat supply was an explanation given for the lack of
217 socialism and high stratification "on the shoals of roast beef and apple pie" [60]).

218 The Columbian exchange exported maize and tubers, east in a non-uniform
219 fashion, driving local population explosions. In exchange ungulates were
220 introduced to the New World. Breeding rates were extraordinarily high so much
221 so that ecological damage was caused by often feral "plagues of sheep" (that
222 compares with "plagues of corn" in Europe). 17th C Spanish and Portuguese
223 ranchers maintained herds of 7-10 million animals producing a surfeit of veal in
224 industrial scale pastoralism^[61, 62]. However introduced zoonotic diseases, such as
225 smallpox, decimated local populations probably immunologically weakened by
226 their low meat/high cereal diet as much as lack of "herd resistance".

227 Observers noted that as meat intake increased Native Americans health improved
228 and they became, they thought by Galenic "humoralism" more Spanish, partially
229 reversing concerns about racial decline with inter-marriages but still creating new
230 castes with the poorest Amerindians displaced to reservations unable to hunt^[63].
231 One astute writer (1596) presciently noted that "meat generates superfluous
232 humours so they now sneeze as we do" suggesting an early switch from infectious
233 to allergic disease repeated in the late 19th century as meat intake recovered from
234 an earlier fall in Europe as we discuss later [64, 65].

235 Maize went east as an important part of the Columbian exchange but of all the
236 cereal staples it has the lowest concentration of tryptophan and nicotinamide so
237 much so that there was an evolutionary drive to cook in a (female)labour intensive
238 process with alkali producing "nixtazmel" in Mesoamerica; but this culture or even
239 mixed planting and eating with beans was not exported east putting those in the
240 east at a higher risk of pellagra – despite this maize was popular as it adapts to
241 variable altitudes and water supplies with high yields unlike wheat or rice^[66, 67].

242 By contrast with successful pastoralists then nowadays many herders are poor.
243 This reflects changes in the meat market with more advanced societies distancing
244 themselves from zoonotic risks and industrializing meat production. Pastoralism
245 per se is no advantage unless it allows the owners a higher income or access to
246 their own animal source foods free of contamination [68].

247 **Meat Elites: NAD "Us and Them" Co-Operations and Conflicts.**

248 We argue that a sliding rule of meat intake benefits states as well as classes by
249 engineering upper "expert" classes with high longevity (adding to their crystallised
250 intelligence) to the lower classes with their "essential" but often poorly paid and
251 dangerous front-line jobs, but higher fertility. As Henry George said in 1879 "***This
252 association of poverty with progress is the great enigma of our times;
253 not to answer is to be destroyed.***"

254 At a more macro- level a latitudinal gradient in food-getting technology to catch
255 prey in the more animal dependant climes exists and once weaponised fuelled
256 northerner's fire-power as perhaps did their more individualistic culture^[69].
257 Luminaries such as McNeill and Maddison mention transatlantic meat flows
258 alongside technological nous in their expositions on the rise of Europe ^[70, 71].
259 Colonialism and World Wars aimed to ensure enough pastureland for the
260 winners and at the same time cutting off the colonies or enemies food supply
261 inflicting developmental and epigenetic scars on the losers, as documented in the
262 Danish "Hongerwinter" of 1944^[72, 73].

263 **Colour and Nicotinamide.**

264 Variation in human skin pigmentation, whether from genetic polymorphisms or
265 tanning, is the most important physical trait used to instantly categorize human
266 groups and individuals ^[74, 75]. Pale skin has the adaptive advantage in low UV
267 environments for vitamin D production. Darker skin protects against the rash of
268 pellagra and the closer to the equator the more populations were at risk as the
269 meat/vegetable ratio falls compared with temperate and polar climes. Resistance
270 to the rash is good short-term but as it serves as an early warning to (self-)treat
271 before more serious and harder to spot effects on cognition that may be
272 disadvantageous at a population level and opens a door for discrimination .

273 The idea of intellectually and morally inferior races based on complexion (that
274 otherwise seems absurd), accelerated with the scramble for Africa and Atlantic
275 with slave-owners conveniently believing whites and blacks were different species -
276 views that others did their best to dispel "**God hath made of one blood all**
277 **nations of men**". Links with low meat intake go back to Saharan trades with
278 captives turned to slaves from civil wars usually over the meat supply as equatorial
279 pastoralism is harder. Local ungulates resisted domestication and are threatened
280 by large carnivores and year round transmission of vector-borne diseases in the
281 vast tsetse fly belt - and by rapid proliferation of pathogens in food in the heat .

282 Many believed they were sold for cannibalism but in fact died in droves in the
283 sugar plantations of the Caribbean ; in the Americas they were fed somewhat
284 better such that fertility rates allowed for generations to be born in slavery - but
285 were not so well fed as to avoid pellagra particularly after emancipation and
286 neoslavery ^{[76, 77],[78] [79, 80]}. Policies directed at indigenous and imported peoples
287 were early assimilation or attempted annihilation if expropriating hunting lands
288 or "Buffalo Bills" executing bison but "last drop of blood" and segregationist
289 policies that allowed reproduction if more after labour - either policy conspired to
290 deliver an inferior diet for many^[81]. In contrast to the Comanche and their
291 colleagues, cattle now fenced in by barbed wire on ranches and ranges and
292 protected in a "6-shooter colt and cowboy empire" created a beef and red meat
293 republic and industrialized meat processing, as in Chicago, for an international
294 capital market aided by steam railroads and ships with refrigeration.

295 Confederate cotton states that housed pellagra were in the forefront of
296 supremacist "White privilege" "Klansman" and "America First" thinking. The

297 common interests of this multi-colored underclass were muted by racial tensions
298 encouraged by white elites to divide and rule the workers and even written in to
299 national and state constitutions and laws. W.E.B. Du Bois writing after the
300 American Civil War referred to a divisive dignity with being white seen as a
301 substitute for inclusive economic policies that could have improved diet for all
302 assembly-line and other workers: degradation of black labour being seen as more
303 important than uplift of white labour. Even the 1890s Farmer Alliance bottom-up
304 populist movements were weakened by segregation and racism undermined later
305 “Wars on Poverty”.

306 Others were not immune as poor Italians, Irish and Gypsies or even alcoholics in
307 degenerate “drinking classes”, also prone to pellagra, are often considered inferior
308 races [82]. Genocidal thinking against others, such as Jews or the Tutsi tribe, may
309 be because they were thought superior but these are historical exceptions as are
310 those examples of collectivist and communist anti-middle class agendas, such as in
311 China, Russia or the Cambodian Khmer Rouge. Most of the rest are subject to well
312 fed “White Anglo Saxon Protestant (WASPs)” and Western, Educated,
313 Industrialized, Rich and Democratic (WEIRD) people being in charge though this
314 in reality may allow for the mediocre to flourish. Diet and type of agriculture when
315 contemporaneously studied across America or across countries affects cultural
316 norms from “tightness” to a “looseness” that supports a more individualistic and
317 entrepreneurial society with extreme wealth inequality – “tightness” maps
318 closely to former pellagra states or cereal based cultures and collectivism with a
319 high incidence of chronic infections and other signs of poor development [83, 84].

320 **Beyond the Pale: Pellagra and the Undeserving Poor**

321 The “undeserving poor” whether amongst white skinned “Hillbilly” rural classes
322 in America or in England (originally noted by Cobbett in 1872) were prominent
323 sufferers from pellagra and like poor blacks attracted the attention of eugenicists
324 and social Darwinism although, to be fair, more positive “social hygiene” ideas
325 targeted diet and education.[85] [85]. Developmental impairments may have
326 spawned the “sciences” of phrenology, physiognomy and craniometrics that helped
327 create myths about black racial groups having deficits in brain capacity.

328 Push-back has occurred with peasants, slave (“Black Spartacus”), and many
329 indigenous people’s revolts although poor diet may weaken resistance. Pellagrins
330 had specialist trade unions and newspapers “Il Pellagrasso” and, driven by
331 “Pellagraphobia”, “Pellagrasorium” hospitals. School meals welfare programs have
332 a surprising history for example in being promoted by the activist Black Panthers
333 despite attracting heavy opposition from the FBI who perhaps realized those at the
334 knife-edge had got to the heart of the matter of connecting diet to power and the
335 political economy[86]. The rise of the middle classes and enlightenment thinking on
336 food and the first restaurants insisted on regimens elaborating on meat and 2
337 vegetable based diet [87, 88]. Frustration such as by the 20th C solidarity movement
338 in Poland was driven by annoyance at queueing, often unsuccessfully, for meat
339 that eventually freed them and others of the communist yoke[89].

340 **Poor Immigrants Emigrating for Meat**

341 “Out of Africa” hunting parties from around 70,000 years ago (and earlier for our
342 hominid ancestors), was driven by the need for meat. Later meat food-ways in the
343 age of migration and the “hungering for America” came from groups known to be
344 pellagra prone such as the Irish, Italians and Mexicans. Once arrived, they ate like
345 the aristocrats they had left behind. Similarly the African-American northern
346 “great migration” around 1879 of some 6 million freed “Exodusters” were fleeing
347 from the pellagra-prone southern states. The initial poor state of all such
348 immigrants, that included smallpox outbreaks in slums, contributed to
349 xenophobic discrimination as did their high fertility setting off worries about
350 degeneration and displacement of the local whites^[90] ^[91].

351 **Gender, Religion and Nicotinamide**

352 This overlaps with gender inequality that explores a similarly dark history. Female
353 sex, like colour, is compounding risk factors for pellagra with men, the “bread-
354 winner bringing home the bacon” and also the “carver” controlling and rationing
355 the meat amongst family members were given priority over women. This long
356 standing dietary disadvantage and lost privilege over meat rations may have
357 increased fertility but could have spawned much male entitlement including to sex
358 (sometimes traded for meat)^[92]. High fertility, as mentioned attracts criticism as
359 “Welfare Queens” and the attention of eugenicists, family planners, and as a part
360 of “Great replacement theory” these worries intersect with antipathy to rival
361 religions that promote reproduction and rely little on converts.

362 **Occam’s Razor: Real Bias is against the Less Educated.**

363 Intersectional and multiplicative effects of these injustices and many exceptions
364 from superficial markers, that may reflect the cultural schisms and “identity
365 politics” of the day, is compatible with a common more material and tangible
366 cause in diet. Indeed the politics of recognition may at times be at odds with the
367 political and human need for redistribution. Diet induced poor cognition that, if
368 unrecognized, neither allows for equality of opportunity or for society to show
369 solidarity with those who do not rise (even though essential workers), leading to
370 their segregation or even incarceration ^[93, 94],^[95]. Data suggests that the college
371 educated “meritocracy” (usually well-fed), have more bias against less-educated
372 than they do against any other dis-favored group as a “tyranny of merit” . This is
373 even true of America’s black upper class that originated in freed slaves, or because
374 they worked inside the master’s house, had a better diet than field slaves and more
375 access to educational material. Dietary differences could explain disparities
376 between communities given that success differs between black Caribbean’s and
377 black Africans with both performing better than poor whites and neither better
378 than rich Asians or rich Whites. Lower IQ, often in the “Imbecile” ran were core
379 features of “pellagra sine pellagra” who frequently failed the very basic tests
380 required to join the military. A good diet was important to the evolution of
381 “WEIRD” people^[96]. The net track record of such intellectuals realizing they are
382 part of a “meat elite”, rather than having a superior genetic or racial endowment,

383 or sticking up for the poor or racial groups or believing in an overriding role for
384 artificial selection is a classic “trahison des clerics”^[97].

385 Dietary head starts also define Diamond’s milestone hypothesis on global faunal
386 inequality with “lucky latitudes” for farming at the onset of the Anthropocene.

387 **Meat Inequality: The Climate Link.**

388 The origin of the climatically benign Holocene heralded the “Anthropocene” that
389 consists of a series of horticultural and agricultural developments - some even call
390 it the “Plantation-ocene”^[98, 99]. The Anthropocene influenced climate by
391 deforestation and terraforming affecting CO₂ and methane emissions from rice
392 production and animal domesticates keeping the benign Holocene climate
393 rolling^[100] ^[101, 102]. These arguably reversed temporarily after the pandemics of the
394 Columbian collision - as the 1610 “Orbis spike” – and a “Little Ice Age”. An
395 unhomogenised intercontinental meat supply and green agricultural advances has
396 ever since driven population explosions of both domesticates and ourselves.
397 Alongside the advent of fossil fuels and artificial fertilisers these have conspired to
398 become major contributors to climate change with further inequality in ruptured
399 “Sacrifice Zones” characterized by low to negligible meat intake variances that
400 make for both a “Meat-obscene” and a “Planet under Pressure.”

401 **Farewell to Alms – One for All and All for One.**

402 Dietary variances may allow some wanted diversity and plurality but meat became
403 the origin of inequality however this was against strong resistance as reflected in a
404 fitful history over the right for a balanced diet that we will now summarise^[103]. As
405 has been said ***“The arc of the moral universe is long but it bends
406 towards justice.”***

407 Aristotle first proposed that government provide good nutrition by means tested
408 communal meals and that private land could be used by people in need so that all
409 could flourish. Utopian thinking pleading for public help for paupers such as by
410 4thC Saint Ambrose – ***“the earth has been created in common for all, rich
411 and poor”*** – and the 13thC Thomas Aquinas and 16thC Juan Vives and Thomas
412 More argued that stealing if hungry was not a criminal act with the latter in his
413 Utopia (1516) first suggesting a Universal Basic Income. Later John Locke (1689) a
414 strong supporter of the state protecting the sanctity of private property rights
415 excluded cases of “pressing Wants” where stealing if hungry could be justified -
416 ***“God hath not left one Man so to the Mercy of another, that he may
417 starve him if he please”***. Thomas Paine (in 1796 irritated by a bishop
418 preaching ***“God made rich and poor”***) argued for redistribution ***“not bounty
419 but justice”***- not with scraps, crumbs or handouts but compensation for lost
420 farmland to ***“buy a cow and to cultivate a few acres”***. Howlett (1781)
421 however insightfully felt that opposition came from a gravitational pull to increase
422 fertility and create a labourer class^[104].

423 There was further intellectual support in early “socialist” and (French and
424 American) revolutionary thinking of provision as a right not as charity. Thomas

425 Spence's pamphlet ("The Rights of Infants" 1797) and Charles Fourier are good
426 examples – "***If the civilised order deprives man of hunting, the class***
427 ***that took the land owes to the frustrated class abundant subsistence***".
428 Von Humboldt with like-minded agrarians including Goethe and Jefferson and
429 Madison in the infant USA understood the effects of colonialism and deforestation
430 and the need for less parasitic approaches to nature bucking the biblical
431 "***dominion over all the earth and every creeping thing***". Many empires
432 encountered local resistance and insurgencies such as the Indian Mutiny of 1857
433 with early dissent from universalist thinkers who eschewed biological racism and
434 believed all men to be equal such as Burke, Bentham, Smith and Diderot (1780)
435 were concerned about European explorers, pioneers, and colonialist unjust
436 attitudes "***instead of recognising this man as a brother, you see him as***
437 ***a slave***". This enlightened attitude later lost out to civilising missions of
438 "backward societies" and the frontier spirit, supported by Mill and de Tocqueville,
439 and racial ideas of white superiority mitigated but not solved by Wilberforce and
440 the anti-slavery movement or the American civil war.

441 **Enclosures, Empires and the "Third World".**

442 Oppositions to underhand removals and expropriations of common pastureland
443 from serfs are recorded. Resistance included the Magna Carta (particularly the the
444 Charter of the Forest (1217) that talks about "common herbage") and the 17th
445 Century leveller movement and opposition to the notorious Black Act (1723) [105,
446 106]. Poachers and commoners even blackened their faces to disguise their identity
447 and to show solidarity with slaves. Nevertheless Arcadian grasslands got eroded
448 by the "enclosure" movement and punitive laws for poaching and the birth of
449 "***Enemy of Nature***" capitalism with its lack of recycling manure as natural
450 nutrients back to the soil and "metabolic rifts" as first proposed by Marx.
451 Enclosure of pastureland is also associated with the concept of "social closure"
452 when scarce resources only get shared with those of the same class such as certain
453 clothing and education – and the rich monopolising a gourmet taste for meat^[63].

454 Dietary ideals sank into oblivion with imperial grabs of land creating "new
455 Europe's" with "cash crops and stocks", mining of bones from Napoleonic
456 battlefields and importing guano for fertiliser, and the "triangular" slave trade.
457 Governments and companies employed armed forces to crush uprisings with
458 "scorched earth" campaigns leading to famines and genocides creating the third
459 world by kyboshing local development and introducing pellagra-genic maize [107,
460 108]. **Figure 3.** Imperial interlopers farmed then imported cattle improving their
461 diet at others expense resulting in "slow violence", "long dyings", "zones of
462 abandonments", "necropolitics" and "tristes tropiques" and "Victorian holocausts"
463 with both ruins and ruination^[109]. Other plunders and blunders include the ugly
464 histories of the Irish famine, the Scottish Clearances, the Soviet war on the Kulaks,
465 the US "dustbowl" and the Chinese Cultural Revolution. Colonial near starvation
466 led to debilitating phenotypic adaptations (in survivors) often acquired in
467 childhood in "metabolic" ghettos, such as by Native Americans and Aboriginal
468 peoples thrown off their hunting lands; or later as in the legacy in the Caribbean of
469 a low meat/high sugar diet followed by a western diet triggering the "double

470 burden” pandemic of metabolic (“amputation capitals”) and cancerous
471 syndromes^[110]. Slave trade reparations were not given to the to the slaves or to
472 their epigenetically affected descendants however there is some history of trying
473 to help the poor locally^[111].

474 **From Poor Laws to Meat Rations**

475 Elizabethan poor laws were a reaction to the dissolution of the monasteries and a
476 resurgence of “Royal Forests” that reduced common pastureland. The 1834 poor
477 law with workhouses and means testing legitimized the concept of the undeserving
478 poor and resulted in Edwardian slum-dwellers being no better off than the later
479 starving victims of Somalia or Rwanda. Poor diet came to the fore when the state
480 of recruits to the Crimean and Boer wars affected the country’s defenses with
481 hunger marches adding to the pressure.

482 Initiatives such as a broader diet in WW2 rations and school milk and meals
483 improved health and infant mortality as did “cradle to grave” welfare states.
484 Lessons on the primacy of diet still got forgotten and never rolled out
485 internationally despite experimental evidence that poor diet influenced
486 individual, class, tribal and national success^[112].

487 More evidence on diet comes from the Indian caste system as the lowest
488 untouchable class (Dalits) in a “metabolic ghetto” were short and unhealthy on rice
489 and vegetables compared with Brahmins (who ate nicotinamide rich buffalo milk,
490 yogurt and butter) and other castes on wheat and meat. In Kenya the meat and
491 blood eating Masai were taller and healthier than the vegetarian Kikuyu tribes,
492 who suffered greatly from TB. Specific mention was made of the near impossibility
493 of modernising in the Caribbean on a plantain diet yet botanical benevolence, such
494 as introducing sago plants and breadfruit, was commoner than promoting meat
495 perhaps as the immediate pressure usually seemed to be about bread.

496 “Flour wars” have triggered the downfall of empires and aristocracies such as in
497 18th C France and early 20th C Russia and along with the British experiences in
498 Ireland and Bengal and the recent bread riots in the Arab Spring uprising suggest
499 that the food supply chain is an iceberg underlying stable societies and financial
500 markets. Governments and commerce should aim higher than avoiding caloric
501 starvation^[113]. Indeed WW2 rationing was thought to have made class war obsolete
502 with a nutritional egalitarianism, that covered meat and milk, and led to a 30
503 year upswing in equality lasting long after the normal levelling effect of the
504 exigencies of war^[114, 115]. This temporary upswing included “sharing the prize” with
505 black southerners in America helped by the civil rights revolution that had not
506 happened with the 1930’s New Deal that was, despite some good aspects,
507 racialized on housing and jobs and therefore the income to buy meat^[116, 117].

508 **Tiger Economies – A Unified Field and Food Theory.**

509 The age of Industrialization increased the gap between the North Atlantic states
510 and the rest of the world: the former had high meat intakes with the “laggards”
511 being cereal dependent. Japan overcame Buddhist piety that proscribed

512 consumption of four legged animals, imported beef and altered their class system.
513 Later “Tiger” economies built arcs of food security less hooked on subsidised
514 cereals and more generous on the more elastic need for meat. They realized, or
515 were advised, to “use it (their land) or lose it” risking become “banana” republics.
516 The lesson of the 19th C Ireland “meat republic” is apposite as the Irish landowners
517 exported cattle to the UK whilst their own cottager population boomed on a poor
518 potato diet until blight led to widespread starvation and emigration^[118, 119].

519 China followed suit, after disastrous collectivist experiments when some 45 million
520 people starved, and massively increased meat consumption surging to the
521 forefront. India have followed but with lower increases in meat consumption (and
522 lower growth), as has Latin America but not sub-Saharan Africa. Cuba managed
523 with modest increases in meat consumption to demonstrate beneficial effects on
524 measures of health and happiness^[15, 120]. Such countries achieved modernity with
525 no significant aid that usually came as subsidised cereals or the “Green
526 Revolution” unlike much of Africa.^[121] Cereals and sugars along with apartheid
527 thinking of Africans being inherently poor unscientific farmers in “cattle
528 complexes” considered as wealth not food in a “malnutrition syndrome” (whilst
529 valuable food is exported) has created a vicious cycle leading to “starving on a full
530 stomach” and micronutrient deficiency, including B3/Nicotinamide and pellagra
531 outbreaks particularly amongst refugees from war. The paradox here being that
532 Africa has plenty of sun and enormous land-banks but their agricultural methods
533 and utensils would be familiar at the time of Christ creating crop yield chasms with
534 knock-on effects for animal fodder and meat intake.

535 Tables have been turned in that food exporters are now in the rich world that
536 subsidises its farmers with the poorest countries off-shoring even grain staples
537 risking international food spikes. “World-making” needs more international
538 effort than expecting self-determination to help with diet and could be seen as a
539 practical reparation^[122]. After all, the development of a European core was given
540 priority over colonial settlers raising cattle for sale at the centre at prices that
541 excluded the peripheral colony and allowed the industrial “take-off” ^[123, 124]. The
542 rise of Anglo-American hegemony and the current convergence in a predominantly
543 Asian drama correlates with meat intake but could be enacted everywhere to help
544 demographic and disease transitions.

545 **Levelling Playing Fields.**

546 If looking backward to imperial violations provides no traction risk of pandemics
547 and wars may be the better bargaining tool as poor countries are not, after all,
548 stationed on Mars^[125]. The history of disease and demographic transitions when
549 the West was just as poor is instructive as progress correlated then to an increased
550 meat and milk supply and the colonial “klepto-parasitic” meat-trade ^[126, 127] ^{[128,}
551 ^{124]}. As Walter Rodney said in his 1972 book on how Europe underdeveloped Africa
552 **“Pellagra was unknown in South Africa till about 1914”.**

553 Many have commented on the importance of meat and skimmed milk on health
554 in particular the incidence of TB – and as a cure for Kwashiorkor and is the basis
555 of many school milk and meals programmes. These early 20th C programmes often
556 driven by fear of TB were sometimes reversed such as in 1950's south Africa for
557 African but not European children as they were “white man's food!” [129] [110].

558 **Beefed up: Au Revoir “Old Friends” and Plagues.**

559 It is difficult to overestimate the pervasive importance of TB the “White Death” in
560 the 19thC that mysteriously vanished (as did other infections) first in the wealthy
561 as Disraeli pointed out *“Two nations: as if inhabitants of different planets
562 formed by a different breeding and fed by a different food – the rich
563 and the poor”*. At this time food imports (the UK at this point accounted for
564 80% of the trans-equatorial meat trade) were aided by lower shipping costs,
565 trains and salting then refrigeration^[130, 131] [117]. **Figure 4.** Better breeding helped
566 as did the rise in the use of poultry. The case for nicotinamide intake being causal
567 has been that TB excretes and is inhibited by nicotinic acid with many antibiotics
568 being analogues and that TB incidence always rises on a poor meat diet^[132, 133]. TB's
569 toxin, an NAD glycohydrolase, depletes the macrophage of NAD on a cell-death
570 pathway that enables replication and dissemination. Over 300 like toxins are
571 responsible for other pandemics^[134, 135] so NAD levels offers “broad spectrum”
572 protection against many organisms that is lost if diet then deteriorates

573 **Inflection: Inflammatory Disease in Affluent Geographies.**

574 As TB, died down a promiscuous range of auto-immune, inflammatory, and mind
575 altering “Diseases of Modern Civilisations” took-off alongside infertility, first in
576 the upper classes who eat more meat^[136, 137]. A less plant based diet affects
577 fermentation-derived short-chain fatty acids such as butyrate that interact with the
578 nicotinic acid receptor^[138, 139]. This flip also relates to the altered education of
579 immune systems as “Absent Old Friends” affect the differentiation and migration
580 of antigen-specific protective regulatory T cells and the balance with pro-
581 inflammatory T helper 17 (with BCG having mitigating effects). The result is
582 “immune intolerance” to otherwise harmless antigens and allergic and auto-
583 immune disease^[140, 141]. As already mentioned a prequel took place in the Spanish
584 New World when those on a higher meat diet developed “sneezes”.

585 **So Long So Much Auto-Immunity – Example of MS**

586 Less Tryptophan in diet abrogates pathology in models of multiple sclerosis. MS is
587 not the only auto-immune disease where one can link diet, microbiomes,
588 autoreactive T cells, and IDO- 1 mediated tryptophan breakdown^[142, 143]. Risk
589 factors include meat, low Vitamin D, genetic pro-inflammatory predispositions,
590 and inter-current infections that all affect T cell regulation. Adjusting tryptophan
591 and nicotinamide in diet could lead to more resilient Treg/T (17) helper cell ratio –
592 the same mechanism that stem-cells or the adoptive transfer of regulatory T cells,
593 helminths or microbiomes are thought to work^[144, 145].

594 **Modern Diseases and the Ageing Stakes – Highs and Lows.**

595 NNMT is a detoxification enzyme reducing nicotinamide levels that controls
596 behaviour, neurodegeneration and lifespan by regulating energy, methylome and
597 autophagy. NNMT is raised in many diseases of affluence whilst NAD levels fall:
598 enzyme induction could be from high nicotinamide intake [146, 147]. **Figure 5. As**
599 **Brenner has said “NAD coenzymes catalyse the conversion of**
600 **everything we eat in to everything we are and everything we do”**. High
601 nicotinamide dosage from plentiful meat and milk often with supplements may
602 play a part in diseases of affluence as is fairly well established for red or processed
603 meat and cancer, particularly colorectal, and deaths and yet in Japan a
604 “Goldilocks” diet with more meat and dairy is thought to be responsible for a
605 decline in cerebrovascular mortality and their unusual longevity^[148].

606 **Pellagra: Longevity at a Price**

607 Theories on ageing involve nicotinamide: pellagra was a real world case of
608 premature ageing consistent with rises in life expectancy and lower incidence of
609 dementia when diet improves [149, 150]. Longevity pathways, are activated by NAD
610 booster molecules. NAD- rhythms are lynch-pins that explain circadian clocks and
611 physiological states from hunger to fatigue to stress, and even the effects of
612 alcohol. Antagonistic pleiotropy, a popular theory for ageing with genes important
613 in development having adverse effects from relaxed selection in later life or
614 developmental run-on includes NAD-consumer and NNMT genes [151, 152].

615 Pellagra comprised of dozens of mimics of neurodegenerative diseases and
616 psychopathology that selectively affect high energy neurones in complex synaptic
617 circuits. Topical explanations invoke proteinopathies, mitochondrial failure,
618 inflammation, oxidant stress, calcium dysregulation, gut dysbioses, and
619 neurotransmitter loss that were downstream events in pellagra [153, 154].

620 NAD may be the common denominator and “silver bullet” for cells with competing
621 “mouths to feed” that with genetic or co-existent environmental factors gets
622 channelled to various phenotypes spreading in “vulnerability networks” and prion-
623 like waves. Nicotinamide may need to be adjusted by genome and age to avoid
624 DOHaD, “disposable soma” or antagonistic pleiotropic effects that may only kick-
625 in later in life requiring the higher nicotinamide and more ancestral diet [155].

626 **Nurture over Nature: NAD World 3.0 – Barometers and Monitors**

627 Measuring ourselves embedded in an “NAD World” may be a parsimonious way of
628 emancipating metabolic controls and energy flows to “refresh parts others cannot
629 reach” by optimising nicotinamide dosage [156, 157]. **Figure 6.** Nicotinamide
630 replacement or “Nutraceuticals” in general (often selling “candy” and empty
631 calorie-ization) should not be the sole focus given negative effects on the
632 methylome. Randomised trials varying meat intake are not realistic (first
633 suggested by Daniel at the court of Nebuchadnezzar) but the predicted value, with
634 a low ceiling effect, would lie in better cognition, resistance to microbes and “K”
635 style fertility prioritising quality.

636 **Human Right to Breathe Right.**

637 Subpar NAD levels are metabolic headwinds and pseudo-hypoxic states literally
638 taking peoples “breath away” but, unlike meat, oxygen is free. Water is critical as
639 splitting it is at the photosynthetic heart of an NAD World with riparian “hydraulic
640 societies” raising civilizations ^[158, 159]. Although water can be a flashpoint on the
641 whole cooperation has prevailed (with some high profile exceptions about dams or
642 privatization), as it did over cleaning up water supplies to avoid infections such as
643 cholera - perhaps because it was more obvious that the poor could infect the rich
644 as is also true of air pollution (that now includes rising CO₂)^[160]. This danger is
645 just as true for diet where obstacles should be overcome to deliver a “nicotinamide
646 rush” as the platform for human capital, capacities and capabilities and to reduce
647 the danger of zoonotic pandemics ^[161, 162].

648 **Meat Dangers: “X” Diseases, “Y” Plagues and Zoonoses**

649 Desperation for meat and cannibalism is implicated in prion diseases as is feeding
650 meat to herbivores that triggered bovine spongiform encephalopathy and new
651 version Jacob-Creutzfeld disease where NAD depletion has been implicated,
652 consistent with the prion mimics seen in pellagra epidemics ^[163, 164].

653 **Red Flags and Blind Eyes: Something New under the Sun.**

654 Opportunistic zoonoses are prominent (70%) causes of human scourges, a price of
655 the (peri-) domestication of animals ^[165, 166]. Some think influenza strains and
656 plagues arose and spread in tribes wandering with cattle over lands conquered by
657 Genghis Khan ^[167, 168]. Recent emergent diseases include Marburg (1967), Ebola
658 (1976), HIV (1981), Nipah (1998), SARS (2003) and other Coronaviruses like
659 COVID-19^[169-171]. Cauldrons and hot-spots of emergent infections are built in high
660 density populations with land cleared for agriculture encroaching on animal
661 territories or are due to the desire for exotic foods^[172, 173]. Those that heap
662 opprobrium on current animal markets need to look back to London’s 19th century
663 costermongers who sold live meat in carnivalesque markets^[174, 175] ^[176, 177].

664 Poor and dangerous meat supplies have been described as “Structural violence” or
665 ^[178, 179] as for several billion wildlife consumption, or the income from household
666 farming outside industrial “dragonhead” enterprises, is the only way of avoiding
667 the “hidden hunger” of micronutrient deficiencies whether iron or vitamins A, D,
668 B12 and B3 ^[180, 181]. Campaigns to ban wildlife hunting needs thought if aimed to
669 improve pandemic preparedness without leading to an even poorer diet for the
670 “have-nots”. As Lederberg said of viruses this is really a matter of **“Our Wits and
671 their Genes”**. Zoonoses can be predicted and could be prevented by stringent
672 surveillance of wildlife consumption with safe-guards including better hygiene
673 with butchers and less exposure of Guano farmers to bat droppings ^[182, 183].

674 **COVID-19 Exposes an Achilles Heel**

675 Pathogenic coronaviruses use the inducible angiotensin converting enzyme (ACE2)
676 receptor to invade species that has roles in renin-aldosterone, tryptophan,
677 immune-competence, and the microbiome ^[184, 185]. ACE2 is a chaperone for the
678 amino acid transporter particularly regulating tryptophan uptake and interacting

679 with Hartnup mutations that cause a multifactorial pellagra-like disorder. Covid-
680 19 may have similar effects to *ace2* knockouts affecting tryptophan convoys with
681 loss of T cell homeostasis and Interferon responses affecting reactive and over-
682 reactive immune responses [186, 187]. **Figure 7.** Some effective Covid treatments
683 such as Dexamethasone and Tocilizumab affect this kynurenine pathway [188, 189].
684 Prominent enteritis and neuropsychiatric complications with (myoclonic)
685 encephalopathy and “Long Covid” and other delayed complications are
686 reminiscent of pellagra. As with other microbes being NAD-replete in the first
687 place should improve host resistance and low initial NAD levels may explain
688 several risk factors such as age, poverty and disability particularly if then
689 exacerbated by post-Covid austerity diets as economies fail [190, 140] [191] [192].

690 **Population Matters Redux – Crunch-time for Non-Coercive Measures.**

691 Earlier we referred to Malthus’ observations on a cereal dependant population
692 and introduced meat in to the demographic debate as a quality versus quantity
693 piece of a complex jig-saw^[193] [194, 195]. Formulae such as Environmental impact =
694 Population x Energy consumed per capita - show that population counts
695 particularly when energy consumed per person is high [196, 197]. Coercive population
696 measures have had mixed results as have state “cash for babies” procreation
697 policies and has stigmatised debate. Cereal supplements increase infant birth
698 weight but reduce time to next pregnancy whereas a diet with adequate meat
699 directly and indirectly (through better education) speeds demographic transitions.

700 The extremes are striking with population predicted to fall by 50% in rich
701 countries but to increase by 300% in poor African nations, such as “zestful”
702 Nigeria, with consequences for age structure, economic potential, migration and
703 geopolitical power. There is currently little recognition of dietary drivers even
704 though de Castro proposed that malnutrition was the cause not the effect of low
705 quality population explosions 70 years ago^[198].

706 **Cutting to the Chase: Mean about Meat Means to a Bad End.**

707 A remedy is to retro-shift to the 18th C idea of liberty that imposes state obligations
708 to ensure “*bon marche*” not basic “bread and circuses”. Adam Smith wrote, after
709 observing European induced injustices, “greater wealth may inspire respect for the
710 rights of one another” with a fairer “slice of the pie”. Peak meat has surely passed
711 for the rich and needs to be levelled at say 30kg pa reducing food related
712 emissions by a third (or more if switching from beef) and benefitting health.
713 Given the world is home to 5 billion ungulates and 22 billion chickens this should
714 provide an optimal “flexitarian” diet for all - with a role for plant-based meat
715 substitutes and affordable lab-grown meat or tucking into “cricket snacks”. Many
716 political systems have accepted the need to supply grain yet none treat meat as a
717 need rather than only for those who have the means. (16th C Henri 1V of France’s
718 “chicken in the pot” for peasants was the exception). Rulers, from fascists to
719 socialists, have recognised the power of food as a tool for their territorial ambitions
720 whilst not balking at using it to starve their own people or only supporting equal
721 sustenance for the working classes if linked to productivity^[199]. One predicament

722 of modern democracies is that they legitimize and spend large sums on defined
723 disease, much in the last years of life, yet delegitimize those in dietary poverty
724 normalizing their premature deaths. As Kropotkin (1892) said **“Well-being for
725 all is not a dream”**.

726 If they addressed these dietary issues rulers may find that their citizens are
727 healthier and less likely to reject basic democratic principles or descend in to
728 mono-culturalism, restrictive immigration or insurrections.

729 The ill effects of inequality, austerity and pauperism from “*Ancien Regimes*” to
730 modern times on health, well-being and social mobility are well documented. Most
731 narratives swing between clashes between oppressors and the proud oppressed
732 and how oligarchies have self-perpetuated. The exact mechanism for harm, other
733 than invoking stress or “social determinants” or “weathering”, is however unclear.
734 Stress reduction is, after all, convincingly invoked as a reason for pyramids of
735 power and hierarchy^[200]. Here we spell out how this originally happened in line
736 with ecological and metabolic rift observations on the effects of industrialization
737 allowing food meccas and food ghettos and deserts ^[201, 202]. We propose that once
738 the meat supply became constrained, we evolved on a dietary spectrum with a high
739 meat to cereal ratio supporting a ruling intellectual elite and a low ratio a fertile
740 proletarian essential (yet disposable) working class - and when there is a surplus
741 of population, an unsupported underclass prone to rebellion ^[47]. Turchin however
742 also points out that elite overproduction and intra-elite competition in gilded ages
743 (such as the 1920’s and now) marked by extremes of income, height and health
744 inequality has often preceded ages of discord and societal collapses before a more
745 progressive new-deal social and ecological revival. Increased equality on a “de-
746 growth” and socio-ecological agenda recognizing that there is an abundance of
747 good food to be shared if better managed rather than acting as if the calorie-ization
748 and empty calorie-ization of the poor has solved the problem rather than becoming
749 a tangible commercial determinant of health also affecting NAD homeostasis. This
750 drive for meat security is more sustainable than continuing with a scenario with
751 an artificial scarcity of meat and other “luxuries” encouraged by capitalist
752 concentrations of power in the mega-merged agri-food “Big Food” profit driven
753 sector that leads to reduced public wealth but private riches, biodiversity loss and
754 excess emissions ^[203, 204].

755 Meat elites are now redundant developmental over-runs (not unlike some theories
756 of cancer). Affirmative action needs to correct this dietary discord or actions aimed
757 at the facades fronting inequality will fail. The opposite of inequality in this context
758 is not a Utopian state or a meritocracy of equality but equity of provisions with
759 better metabolic homeostasis and no NAD headwinds for the poor. Hinman and
760 Harris (1939) recognised that the meat eating races and classes have been
761 instrumental to progress and that meatification is a marker and the ladder of class
762 ascension and social mobility. Reframing Aristotle, this corresponds to a
763 hierarchy of needs with a physiologically good diet being met free as a public good
764 (as it basically is already free for the rich) but the equally important self-
765 actualization wants for a good life being left more to an individual’s freedom and

766 drive. Redistributing quality food has been modelled from social and economic
767 perspectives in a new “Moral Economy” as “Sitopias” and “Diets for a Small
768 Planet” that could now be grounded in the constitution and currency of an “NAD
769 World” and seen more as an investment as it closes innovation gaps, as seen in
770 China, as well as reducing risks from pandemics or “superbug” antibiotic
771 resistance [205-207] [208, 209]. Families may be the place to start as they already have
772 “Burkian” style covenants between the dead, the living and those yet to be born.
773 Enough family income to provide meat reflected in more shapely Engel Curves
774 locked in to a top-down international governance structure could work as a
775 “Gramscian” common-sense counter-hegemonic bloc and cry from those stuck in
776 the basement^[210]. Gramsci’s words ring true “The old is dying and the new cannot
777 be born; in this interregnum a great variety of morbid symptoms appear”.

778 **Conclusion.**

779 As Thoreau said with capitalism and its attendant inequalities in mind “**Icarian**
780 **thoughts returned to ground; and we went to heaven, the long way**
781 **round**” Our solution speaks for an algorithm that opens secure and safe meat
782 larders derived from agro-ecological farming regimes that respect the best of the
783 organic and food sovereign movements without forsaking scientific or commercial
784 approaches shorn of soil degeneration from high tillage, excess fertilisers and
785 pesticides and monocrops [211], [212]. New meat technology should help but at the
786 least cleaned up meat production from grass-and even fed-lot grain based farms
787 to tables will help and are unlikely to become “stranded” assets any time soon^[213].

788 Quixotic quests for preventive causes for every known complication of poverty
789 could be avoided by moving the dial to find a “sweet-spot” to avoid nicotinamide
790 under-and over-load. Fair reform could happen without imposing widespread
791 vegetarianism – a vaunted solution that would not benefit the needs of the
792 nicotinamide have-not-half. Discrimination, we say, piggy-backs on meat extremes
793 and could dissolve as it did for the pellagra-ridden “Butterfly caste”, with meat
794 justice leading at the least to a new chapter in the history of inequality by
795 abolishing “Precariats and Proletariats”. Black Egyptian educators were after all
796 the sparks of modern Europe not the blonde races or the later Anglosphere.
797 Condorcet (1795) divided history into ten periods, the last of which permitted “**the**
798 **abolition of inequality between nations, the progress of equality**
799 **within each nation, and the true perfection of mankind**”. A global
800 overhaul that enables NAD equity would return us to our “other regarding” roots
801 that, after some detours to boost population, began with meat and land equality as
802 well as showing that we can rise above Kant’s “self-incurred immaturity” in a new
803 enlightenment movement that this time round is fair to all and might solve a more
804 general syndemic crisis.

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1296 **Figure Legends**

1297 **Figure 1.** Meat and Nicotinamide dosage steadily increased during out evolution
1298 up until the time that we became behaviourally modern. Human brain size
1299 increased and got more globular with Broca's and pre-frontal and parietal areas
1300 becoming prominent and better connected using newfound neurotransmitter and
1301 neuroendocrine facilities. However fertility and population sizes were low, with
1302 several extinctions. The advent of a more plant based, and lower nicotinamide
1303 dosage, diet led to populations expanding but brain and body size got smaller and
1304 infectious diseases emerged.

1305 **Figure 2.** NAD is the crucial carrier for our high energy Hydrogen based needs
1306 for optimal brain function in a “NAD World”.

1307 **Figure 3.** GDP falls as a % of British GDP became extreme in colonial times. Low
1308 meat diets in China, India and Africa compared to Europe and North America
1309 created the “third world”. This dietary inequity is unravelling in places with the
1310 “tiger economies” undergoing “meat transitions” developing the fastest.

1311 **Figure 4.** TB, the “White Death,” mortality shown using London data for 1850,
1312 TB vanished as meat intake increased - chiefly from imports (in exchange for
1313 cotton goods) that in effect exported infectious diseases to the poorly fed and low
1314 meat tropics.

1315 **Figure 5.** NAD declines with age whereas NNMT levels rise in affluent
1316 geographies. Amongst the poor NAD levels would be low at all ages. Major
1317 preventive windows of opportunity present themselves for both rich and poor.

1318 **Figure 6.** This version of an “NAD World” has the dietary and social milieu,
1319 symbionts and pathogens all interacting with biochemical internal affairs. NAD
1320 has a “finger in every pie” affecting circadian rhythms, appetite, exercise alongside
1321 detoxification pathways for plant (and now drug) toxins and oxidant and other
1322 shocks from microbial pathogens and viruses that require resistance and (DNA)
1323 repair.

1324 **Abbreviations**

1325 NMN=Nicotinamide mononucleotide; NAMPT= Nicotinamide phosphoribosyl-
1326 transferase;IDO= Indoleamine 2,3-dioxygenase; NNMT= Nicotinamide N-
1327 methyl-transferase; NRK= Nicotinamide riboside-kinase; PARP=Poly ADP-ribose
1328 polymerases; SIRT5=Sirtuins; CD38= Cyclic ADP ribose-hydrolase; AhR= Aryl
1329 hydrocarbon receptor.

1330 **Figure 7.** Pleiotropic ACE-2 receptor and some overlooked interactions. ACE-2
1331 affects Tryptophan uptake and the BoAT1 neutral amino-acid system and therefore
1332 the kynurenine and the T cell and interferon dependant “immune tolerance”
1333 pathway and exacerbates lost NAD homeostasis from pre-existing conditions (such
1334 as age or poverty and poor diet) or infection induced oxidative stress and its repair.
1335 Coronaviruses could, like ACE-2 knock-downs or the BoAT1 mutations that lead to
1336 the Hartnup pellagrous phenotype, reduce tryptophan and therefore serotonin
1337 levels and cause pellagra-like symptomatology both in the acute phase and as “long
1338 Covid” if not corrected. The renin- angiotensin system also involved in the
1339 pathophysiology could be affected by other vitamins such as Vitamin D.