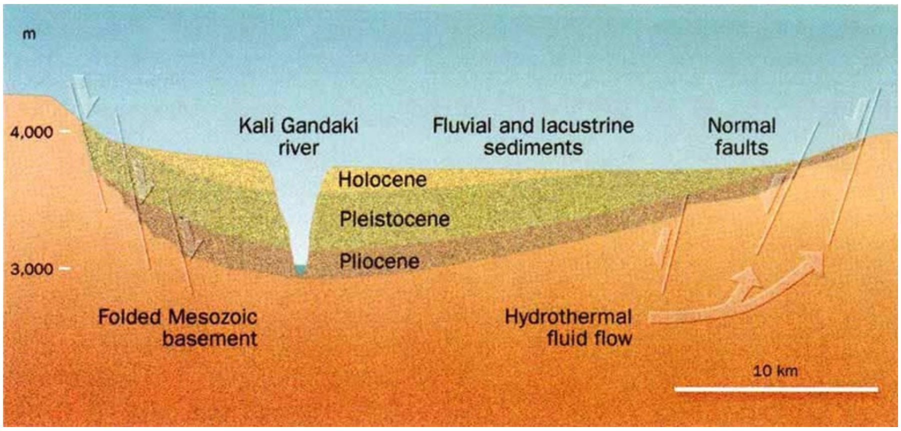

FIG 2. Cross-section of the Thakkola graben. (Adapted from ref. 14.)

aligned normal faults cut the east–west aligned mylonite fabric associated with the South Tibetan detachment, the normal fault bounding the top of the High Himalayan slab. Muscovites from the mylonites, dated[1] at 17.6±0.3 Myr, provide a minimum age constraint on exhumation of the High Himalaya in the Annapurna area. Between 17.6 and about 14 Myr, therefore, the stress field in southern Tibet changed from north–south compression to east–west extension.

Why should a single date be so exciting? The only previous age reported from a normal fault in Tibet is the ^{40}Ar/^{39}Ar cooling age of 8±3 Myr from the Nyainqentanglha metamorphic core complex[7,8], a completely atypical structure in central Tibet that is aligned northeast–southwest. This has been used to argue that the collapse of the plateau was contemporaneous with marked climate change in south Asia and strengthening of the Indian monsoon at about 8 Myr (ref. 9). Coleman and Hodges' new age proves that the plateau must have been high long before the apparent main changes in vegetation and climate occurred. This older age for the maximum height attained by the plateau is supported by ^{40}Ar/^{39}Ar ages of about 13 Myr from potassic basalts and minor felsic magmas[10] in Tibet, which imply melting of the lithosphere.

Nevertheless, it seems likely that the uplift of a feature as large and as high as the Tibetan plateau and the 2,500-km-long Himalayan mountains would have had a profound effect on global circulation, climate and erosion. The uplift of Tibet would have disrupted the west-to-east air flow across the Northern Hemisphere, initiated the monsoon-driven wind systems across India and increased the precipitation along the Himalaya, with higher chemical erosion rates causing a drawdown of atmospheric carbon dioxide and resulting in global cooling[11,12]. The rise of Tibet probably coincided with the initiation of the Indian Ocean monsoon, although the Himalaya today provides the most spectacular and abrupt northern barrier to the monsoon. The maximum rates of erosion and exhumation along the High Himalaya in India, Nepal and Bhutan probably occurred between 21 and 19 Myr ago when the main bounding structures — the Main Central Thrust at the base, and the South Tibetan detachment normal fault at the top of the slab — were active, and most of the tourmaline-bearing leucogranites were being exhumed[13].

The surge in geological data from the Himalaya in the past 15 years has resulted in a spectacular leap in our understanding of collision-related processes. Tibet, however, remains an enigma. Considering the huge size of the plateau, our knowledge of its geological secrets is still based on few facts and a lot of speculation. Crucial factors such as the elevation history of the plateau may be unravelled by a detailed and wide-ranging palaeobotanical study. But the timing of the switch from north–south compression to east–west extension will only be unravelled by mapping in detail all the graben systems in Tibet and, following the lead given by Coleman and Hodges, dating the faults. ☐

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DAEDALUS

Shaking down

LAST week Daedalus identified the human stomach as a low-frequency motion-sensor. It detects our bodily movements for feedback control purposes. We sense its action in a suddenly-dropping lift, and suffer from its misinterpretations in motion sickness.

Daedalus is now extending this bold theory. Could the 'morning sickness' of pregnancy be a form of internally triggered motion sickness due to the movements of the unborn child? Still more intriguing, could our gastric motion-sensor be the long-sought weight-stat that governs the deposition of body fat? Millions of despairing dieters know how strongly the weight-stat resists all attempts to override it downwards. Many people maintain the same weight for years, no matter what they eat; the body clearly knows its own weight rather well. Daedalus now suggests that it monitors not weight but inertial mass, and that its sensor, appropriately enough, is the stomach. Any change in the characteristic motion of the body is sensed directly by the stomach, which reacts by altering the efficiency with which it digests incoming food. This explains why the belly is such an important site for fat deposition. It provides good mechanical feedback to the stomach beneath.

This theory offers some comfort to those naive joggers and exercisers who believe that fat can be dissolved by jiggling it up and down. At least they are providing their gastric motion-sensor with clear signals: a perfectly sedentary fatty would leave it guessing. DREADCO volunteers are now being dotted with small accelerometers, and loaded up with carefully weighed slabs of artificial fat. They are then being put through a variety of exercises, to discover how the added mass affects their main bodily frequencies, their digestive efficiency and their weight.

Slimmers everywhere will await the results with keen interest. If a proper distribution of weights can indeed fool the weight-stat into overestimating the body mass, a new fat-reduction technology will be born. DREADCO will market special slimming undergarments padded out with a nicely judged distribution of plastic 'fat'. The happy wearer will lose weight without dieting or willpower — although his or her new elegant figure may be camouflaged beneath the cumbersome garments themselves. A well designed programme of low-frequency vibro-massage, repeatedly subjecting the body to the correct vibrational pattern, might do a neater job. Sadly, it might give the user severe motion sickness. David Jones