that material above the sampled rock has been eroded. Such estimates apply to periods as short as 500,000 years to as long as several million years. But in all cases they span several glacial and interglacial cycles, and so smooth the effects of large climatic changes.

Reiners *et al.*[1] present the simplest result: erosion rates averaged over the past few million years in the North Cascade Mountains of Washington state correlate with the present-day distribution of rainfall. Precipitation and erosion rates vary by an order of magnitude across the range, with rapid erosion having occurred where rain falls most today. As virtually all of the rock exposed in the mountains must have lain below sea level a few million years ago, they deduce that rock moved up relative to sea level despite the absence of any tectonic process. Because of isostasy (Archimedes' principle applied to the Earth's crust immersed in its more dense mantle)[1,6], removal of a mass of rock from the Earth's surface will be compensated by the rise above sea level of approximately 80–85% of that mass.

By contrast, Burbank *et al.*[2] deny that precipitation has a major role in erosion in their study area, the Himalaya. They measured rainfall along a profile across a segment of the Himalaya, and they compare that rainfall with estimates of erosion rates along a valley floor from the Lesser Himalaya into the Greater Himalaya. A narrow zone separates the Lesser Himalaya (where wide rivers, bounded by sediment-filled terraces, flow through relatively gentle, deeply weathered hillslopes) from the snow-capped Greater Himalaya (where slopes are steep, valleys deep, and weathering and terraces sparse).

Burbank *et al.* measured much more rapid erosion in the Greater than the Lesser Himalaya. More importantly, they detected no measurable difference in erosion rates across the Greater Himalaya despite a fivefold decrease in precipitation there. They infer that precipitation does not exert a first-order control on erosion. Noting that all of the rapidly eroding terrain moves rapidly upward with respect to the lower, gentler region to the south, and leaving open the question of what physical processes cause erosion, Burbank *et al.* suggest that tectonically forced upward movement is the most important factor affecting erosion across a region of such different rainfall.

Using a different thermochronometer, spanning several million years, Wobus *et al.*[4] deduce average erosion rates in a neighbouring part of Nepal. Like Burbank *et al.*, these authors report a large difference between high erosion rates in the Greater Himalaya and low rates in the Lesser Himalaya. Because their thermochronometer applies to a much longer period of time, their results require a larger difference in the amount of rock eroded. Only a few kilometres of rock have been removed from the Lesser Himalaya since the Himalaya began to form some 40–50 million years ago, but in the Greater Himalaya roughly 10 km have been removed since about 10 million years ago. There is no obvious fault or shear zone between them, but Wobus *et al.* logically deduce that the rock in the Greater Himalaya has moved upwards relative to that in the Lesser Himalaya. Whereas Burbank *et al.* attribute the constant erosion rates across the Greater Himalaya to rapid rates of vertical movement of the rock, Wobus *et al.* suggest the opposite: that the rapid rise of Greater Himalayan rock results from its rapid erosion and isostatic compensation of the mass removed.

Common to these three papers[1,2,4] is the sensible assumption that the landscapes studied have reached some form of equilibrium, so that the basic character of the landscape and the rates at which geomorphological processes have shaped it have not changed over the time spanned by the measured erosion.

For their part, Dadson *et al.*[3] examined

Figure 1 **Peak erosion — one of the areas of Taiwan studied by Dadson *et al.*[3]. They conclude that these peaks have been stripped of material by earthquake-triggered landslides. (Photo courtesy of J. C. Lin, National Taiwan Univ.)**

100 YEARS AGO

For some years a very interesting series of experiments in connection with the biological method of sewage treatment has been carried on by Dr. Dunbar, director of the Hygienisches Institut at Hamburg, and by his colleagues. Special attention has been directed to the elucidation of the sequence of changes which underlies the purification process in contact beds and percolating filters… Great importance is attached by the Hamburg workers to the role played by the process of so-called "absorption" which takes place when the liquid is in contact with the purifying medium. It has been found that sterile clinkers have the power of withdrawing from solution not only colouring matters, but also the highly complex nitrogenous bodies found in sewage… An interesting example of absorption is seen in the case of the percolating filter adopted by Dr. Dunbar. This filter is provided with a layer of fine material on the surface about six inches deep. According to Dr. Dunbar, 50 per cent. of the purification, apart from nitrification, takes place in this six inches.

From *Nature* 10 December 1903.

50 YEARS AGO

In case there is any lingering doubt that the Piltdown finds are in part fraudulent, we think that one other fact now brought to light should be published immediately. Suspecting that some of the so-called implements reported from the site might have been 'doctored', we asked Mr. E. T. Hall, of the Clarendon Laboratory, Oxford, to test the composition of their surface stains by means of his X-ray spectrographic method of analysis. He has reported to us that the stains on these flints are entirely ferruginous, with one notable exception. The triangular flint (Reg. No. E.606) recovered *in situ* from the layer immediately overlying the skull horizon is chromate stained. When this stain is removed in acid the flint appears greyish-white. It is indistinguishable from a mechanically broken piece of flint such as one might encounter on the surface of any ploughed field in 'Chalk-land'. Whereas a bone might have been dipped in a solution of potassium dichromate with the sole purpose of trying to harden it, a flint would only have been treated in that way by a forger requiring it to be of a certain colour.

From *Nature* 12 December 1953.