The conclusion that longitudinal dunes occur where there is little sand is unjustified because the EST measurements on which that conclusion is based are incapable of identifying areas with little available sand (because additional sand may underlie dune troughs).

This question about whether longitudinal dunes can occur where sand is abundant has important ramifications to geologists studying aeolian deposits. If longitudinal dunes can occur only where sand is scarce, they should be unable to produce deposits without causing their own destruction or evolution into other kinds of dunes.

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WASSON AND HYDE REPLY—The aeolian sand both in dunes and swales is that proportion of the total arenaceous sediment, lying either beneath or upwind of a dune field, that has been made available for deflation and dune construction. It follows that equivalent sand thickness (EST) in a dune field in which all of the aeolian sand lies within the dunes is a good measure of the sand made available for dune construction. In dune fields where a large volume of aeolian sand lies in swales, EST is a minimum estimate of the total volume of aeolian sand in the dune field. We do not claim[1], as Rubin believes we do, that EST equals the total arenaceous sediment body that might be deflated in either conditions different from those that have prevailed during the history of the dune field or at some future time. Observations in a number of dune fields clearly show that not all sandy sediments have been deflated to form dunes. In the Thar, Simpson and Kalahari, for example, large stores of non-aeolian sand lie both beneath and upwind of the dunes[2,3,4].

Examination of pits, wells and bore-logs both by us and by others shows that significant quantities of aeolian sand lie in swales in fields of star and transverse dunes, very little in fields of longitudinal dunes and none in areas of barchans[5]. The inclusion in estimates of EST of this fraction of aeolian sand would therefore enhance the differences between star/transverse and longitudinal/barchan dunes on our Fig. 4.

We concluded that drift potential (DP, a measure of wind strength) does not correlate with dune type but we now go on to suggest that vegetation and sand moisture have always been modulators of sand transport rates in presently arid to semi-arid dunefields (for example, Australia, Thar, Kalahari). In presently hyper-arid dune fields (Namib, Sahara, Rub'al Khali) sand transport has always responded directly to the fluid medium. We also note the possibility that EST has been controlled by a number of meteorological and biological factors that differ both between dune fields and through time. The control of subaqueous bedforms by the fluid medium does not have a simple parallel in subaerial dune fields. For example, there is no equivalent of vegetation in river bedforms, and the density differences between solids and the transporting media in the two cases cautions against a simple comparison of the kind suggested by Rubin. Therefore, a test of our ideas about desert dune fields using subaqueous bedforms is casuistry. Rubin notes that he does not wish to infer that aeolian and subaqueous bedforms behave similarly, making his comparison even more puzzling.

One of Rubin's objections to our conclusions is his observation that transverse dunes form in some areas where swales are not covered by aeolian sand, thereby implying low EST. In our Fig. 4 only 1σ is plotted about the mean of EST for each dune type so, clearly, low values of EST were included in our sample. We do not claim that all values of EST in transverse dune fields are higher than all values of EST in longitudinal dune fields. We have used statistical significance as our criterion of difference. Rubin's citing of a few undocumented and unquantified examples unfortunately follows in a long tradition in aeolian geomorphology. We specifically set out to quantify relationships using all of the best data available to us, so as to avoid the selective use of examples.

It is relatively easy to see how the variable RDP/DP might influence dune type. The role of EST is less clear, and so our use of this variable is best viewed as an aid to discrimination between dune types. If transport rates have always been higher in presently hyper-arid dune fields, by comparison with presently more humid dune fields, then it is possible that EST reflects, among other things, the presence or absence of long-distance sediment transport by wind. Star dunes have the highest values of EST and occur in areas in the Sahara where sand flow converges[5–8]. Simple longitudinal dunes in the Simpson–Strzelecki dune field of Australia have low values of EST and have been derived from sediment sources close by[2]. It is conceivable that EST reflects dune type rather than vice versa. Rubin's comments have highlighted this unresolved problem but we cannot agree with his conclusions.

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J. A. MABBUTT COMMENTS—The exchange of views between Wasson and Hyde[1] and Rubin has been useful in clarifying controls over sand availability for dune formation, but in my view does not go far enough in considering how this in turn acts to determine major dune type. This determinant would appear to be the extent of non-dune surface suited to the rapid transmission of saltating sand, relative to the area of sand-trapping dune surface. Where the former is so dominant as to leave the dune accumulations isolated, barchans characteristically develop; where the relationship is such as to allow the continued exposure of downwind-oriented non-dune strips, longitudinal dunes are typical; where, on the other hand, the non-dune floor remains completely buried or revealed only in minor and non-connecting troughs, transverse dunes are found. In many dune fields these relationships occur in sequence downwind towards a basin depression of sand accumulation, and there is a corresponding downwind sequence of dune form. A whole range of circumstances can intervene to determine these relationships locally, including thickness of prior sands available for wind-working into dunes, current aeolian sand supply, the transmissivity of the underlying floor, wind energy and vegetation cover.

Patterns of longitudinal dunes, in which dune and non-dune surfaces are more evenly matched in extent than in the other dune types, are strongly influenced by variations in the nature of this non-dune surface. A recent account of longitudinal dunes in the north-west Simpson Desert[2] shows that the non-dune 'floor' can vary locally between soft unconsolidated sand (partly wind-worked sandy alluvium?), firm surfaces of coarse-textured alluvium, and hard gibber pavements. The dunes that cross these surfaces may accordingly vary between wind-sculpted forms, sand mounds assembled *in situ*, and transgressive dunes. There is strong evidence that differences in sand-transmissivity between the non-dune 'floors' have contributed to differences in spacing and other pattern attributes.

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