Improved stability for biological nomenclature

SIR—The pressure from the users of names of organisms on taxonomists to produce more stable systems of names is increasing[1–4]. Names change for one of two reasons: the strict application of the rule of priority or other nomenclatural caveats of the appropriate International Code; or new knowledge on the circumscription, rank or position of a taxon. Changes of the latter kind result from the advancement of scientific knowledge and are of value because they illuminate not only taxonomic relationships but other features, such as physiological and biochemical attributes. Changes for nomenclatural reasons alone, in contrast, benefit no-one.

In perpetuating the present system, taxonomists are failing to satisfy their consumers[5] and it is therefore not surprising that support for taxonomic research and services is limited. The instability of names is a severe handicap for such consumers as developers of data retrieval systems, and for health, trade, conservation and quarantine authorities in drawing up legislation, regulations and property rights protection.

Bacteriologists overcame this problem in 1980 by the adoption of a new starting date for nomenclature and the publication of an 'Approved List' of names[6,7] which reduced the number of species names from about 30,000 to only 2,500. In the case of groups covered by the International Code of Botanical Nomenclature (ICBN), about 36,500 generic and 400,000 species names are in use, out of about 79,000 generic and 1,700,000 species names published. It has been suggested that approved lists of names are issued at five-yearly intervals[8]; that a list of currently accepted names of the world's flora be produced which could be accorded some specially protected nomenclatural status[9]; and in zoology that names in particular books or papers be granted a protected status[10,11].

Proposals to introduce formal procedures for the registration of newly published names[12] were debated during the XIV International Botanical Congress in Berlin in July 1987. A special committee on registration was established which is to report to the next Congress in Tokyo in 1993. Such a process would not, however, overcome the instability caused by the repeated re-introduction of long-forgotten names. The International Union of Biological Sciences (IUBS), with the support of the International Association for Plant Taxonomy (IAPT), sponsored an international meeting at Kew on 22–23 April 1988 to consider the feasibility of the production of lists of names in current use for all groups of organisms covered by the ICBN, namely living and fossil flowering plants, ferns, mosses, hepatics, algae, cyanobacteria, fungi (including lichens) and certain protoctists. The meeting was attended by 23 specialists including key personnel associated with the current cataloguing of names (that is, the *Index Algarum, Index of Fungi, Index Kewensis, Index Muscorum, Index Nominum Genericorum),* together with representatives of selected user groups. A full report of this meeting will appear in both *Biology International* and *Taxon*, but its key conclusions are outlined in this letter.

The preparation of lists of names in current use was agreed to be a worthwhile objective in itself, and, if such lists were accorded protected nomenclatural status, this would almost entirely eliminate the majority of name changes due to nomenclatural reasons. This objective is now technically feasible for the ~ 36,500 generic names in use for all groups covered by the ICBN, given the machine-readable and card files which have already been compiled. The starting point for this list will be the IAPT *Index Nominum Genericorum* database held at the Smithsonian Institution, and it should be published in 1991. The situation for the ~400,000 current species names varies markedly and separate lists will have to be prepared for each group such as legumes, mosses and yeasts. Pilot studies are now feasible, given the necessary resources.

It was decided that the IUBS, through its Commission on the Nomenclature of Plants, be asked to establish a special committee on names in current use. This should make detailed proposals to the next International Botanical Congress about granting special status to the lists of generic names and the appropriate mechanisms for updating these lists, as well as about procedures for the preparation and adoption of species names lists. This committee would work in collaboration with the existing committee which is considering the question of the registration of newly published names.

If the necessary funding can be obtained, there is now a plan which, if accepted by the biological community at large, would materially improve the stability of names of all organisms covered by the International Code of Botanical Nomenclature. The participants in the Kew meeting wish to encourage a lively debate on this matter, and invite comments from both users and taxonomists, which will be considered by the proposed special committee responsible for both the production of the generic and pilot species lists, and for the preparation of detailed proposals for decision at the 1993 International Botanical Congress.

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Seal death

SIR—During the past two months outbreaks of an acute disease have occurred among harbour seal (*Phoca vitulina*) populations in Scandinavian, German and Dutch waters. The most prominent signs of the disease are acute pneumonia in young and adult animals, and abortion in pregnant females. The mortality rate is 5–25%. Cases were first observed in the Danish Kattegat area, where about 200 aborted seal pups and hundreds of dead juvenile and adult animals were found along the coast. The disease gradually spread to the harbour seal populations in the Danish, German and Dutch Wadden Sea.

Epizootiological and post-mortem findings pointed towards an infectious agent as the cause of the outbreaks but the possible role of other factors was discussed during a meeting organized by the Ministry of Environment of the State of Sleeswijk Holstein together with G. Heidemann at the University of Kiel. Special attention was given to the possibility of a triggering role for certain environmental pollutants[1] and of the drastically increased concentrations of certain algae in the same area during the same period. No clear indications for the involvement of these factors were found. Instead there is evidence that one or more viruses are the cause. When virus isolation procedures, using seal primary kidney cell cultures, were applied to the lungs and other organs of 35 dead animals from the Danish, German and Dutch waters, a herpesvirus was isolated from eight animals by P. Häve of the State Veterinary Institute for Virus Research in Lindholm, and ourselves.

Four years ago, we isolated a herpesvirus, *Phocid herpesvirus*-1, during an outbreak of a similar disease with high mortality in baby seals nursed in the Seal Rehabilitation and Research Center in Pieterburen (The Netherlands)[2]. This virus was characterized as a novel member of the Alphaherpesvirinae subfamily and shown to be the causative agent of the disease. Since then, we have shown that neutralizing antibodies to the virus are present in many different pinniped species in different areas, indicating that this, or a closely related virus, is widespread[3].

The herpesvirus isolated during the recent outbreak is being compared with

Phocid herpesvirus-1, but we are also studying a second virus that is cytopathic for seal kidney cells and cells from a number of other species and which was isolated from the lungs of 20 out of 22 dead seals investigated. By negative contrast electron microscopy this virus has been tentatively classified as a member of the Picornaviridae family.

In the past three years we have applied virus isolation procedures to lungs of 20 normal seals and 15 with signs of acute pneumonia. No virus has been isolated from the former animals but 11 of the animals with pneumonia yielded *Phocid herpesvirus*-1. These data indicate that the newly isolated picorna-like virus, or *Phocid herpesvirus*-1, or both viruses, have probably caused the outbreaks of disease among the seal populations. Serological investigations on convalescent seals will be conducted in an attempt to confirm this hypothesis.

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Effect of bedslope on desert sand transport

Sir—Hardisty and Whitehouse[1] report most interesting field data concerning the wind transport of sand when this is either assisted or retarded by bedslope. We believe that these data will have considerable value in developing and testing adequate theories of aeolian transport. However, their discussion appears to take little account of some features of the process which are reasonably well established. In consequence, they attribute the effect of bedslope to a "new sand transport process", whereas it can be attributed more helpfully to the influence on known processes of a gravitational field which is not normal to the bed.

Grains are indeed dislodged predominantly by the collision of saltating grains. Much is now known about the outcome of collisions[2–4], which seem to give rise to two distinct populations of launched grains. Ricochet of the incident grain usually occurs and is vigorous enough to enter another saltation; meanwhile a small number of grains (up to twelve or so) are dislodged and undertake much smaller trajectories which Haff has called "reptations" (see ref. 5). The angle of launch has a considerable range (Fig. 1), a significant proportion of dislodged grains emerging with an upwind velocity component. The saltating grains are essentially wind-driven and follow paths which are very similar for sloping and horizontal beds. Reptating grains, however, travel at levels at which grain-laden boundary-layer flow is very sluggish, and are controlled predominantly by gravity. They account for a substantial proportion of the transport rate. It is to be expected, therefore, that a change, relative to the bed, of the direction of the gravitational field will affect the transport rate much more than is predicted by the quoted equation (5), in which internal shear stress of the grain mass is always resisting gravity.

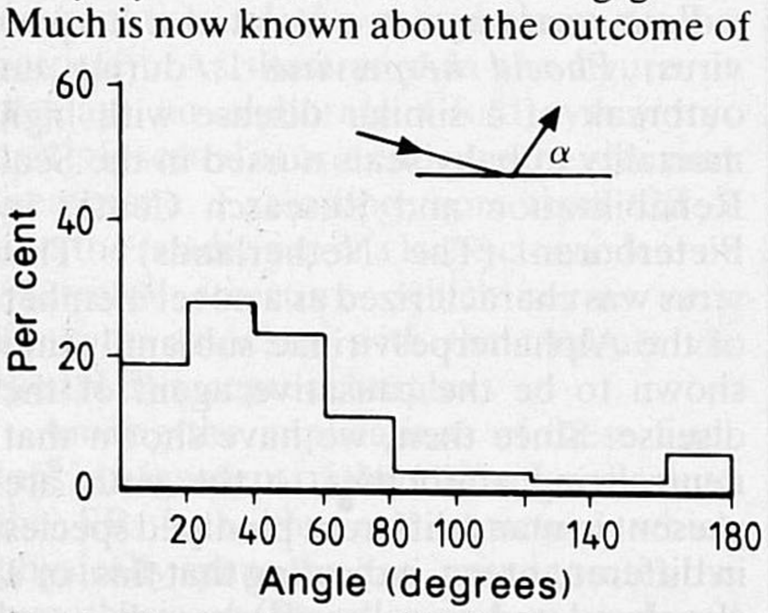

Fig. 1. Distribution, for dislodged grains, of the take-off angle, α, referred to the horizontal bed (see inset).

The effect of bedslope on transport rate can be understood only in terms of the detailed consequences of inter-saltation collision. The data obtained by the authors promise to assist the development of such understanding by extending the circumstances in which grain transport models can be tested. Models already exist (see, for example, ref. 5) which could with little adaptation be used to predict changes of transport rate with θ, such as those reported.

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Hardisty and Whitehouse Reply—Willetts and Rice raise three important points about our paper[1] on desert sand transport to which we would wish to respond. These points concern the sand transport data, the semantics of the subject and finally the source of the energy which drives the impact-induced gravity flow (IIGF) which we postulated to explain the difference between our results and traditional theory.

Dealing firstly with the data, we agree that our results should be used by ourselves and others to test new theoretical developments. To this end we have transferred all our measurements in ASCII format to PC disk. Copies of the disk will be available from the address below.

Semantically we are also in agreement with the papers referenced by Willetts and Rice, which use the word saltation for those grains moving on a trajectory above the bed which is affected by the wind. This distinguishes such grains from those which are said to be reptating; this term being used to describe those grains which are moved above but close to the bed by an impactor and are unaffected by the shearing wind. Both saltating and reptating grains will of course return to the bed at a point which is separated from their starting point by a distance which varies with the bed gradient. Such is the result of the geometry of the grain path and the distribution of jump lengths is well evidenced by, amongst others, the work of Willetts and Rice.

These considerations lead to the final and most important point, which concerns the question of whether the IIGF which we postulated is indeed a fundamentally different process or, as Willetts and Rice appear to be contending, simply reptation on a slope. Without repeating the description which we gave in our paper, we are suggesting that we have observed a different process. IIGF is more closely linked with the observations of grains vibrating about their niche positions during subaqueous initiation on a horizontal bed, which were reported by Gessler[6] and Yalin[7]. These vibrations are produced by fluid shear, whereas we postulate that impacting grains can produce a similar response. Anderson[5] (page 945) referred to such when he noted that less than 1% of the impactors' kinetic energy is transferred to the ejected, saltation and reptation grains, and that the remaining energy induced 'local transient dilation of the bed, inelastic deformation of bed grains, and frictional rotation of the bed grains'. We are suggesting that under a well-developed saltation flux, these mechanisms greatly reduce the shear strength of the surface grain layer so that a type of gravity flow can occur on non-horizontal beds. The process is different from reptation because the moving grains do not leave the sand surface and are not impelled by direct impact. It is difficult to envisage how the type of simple changes to existing, kinetic models to which Willetts and Rice refer will predict these effects. Our empirical equation (6) provides a quantitative estimate of the magnitude of the sum of all of these processes, and the next step is a more rigorous theoretical model.

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