## Nomenclature of immunological markers

SIR—Your editorial policy[1] concerning the nomenclature of markers of human leukocyte differentiation antigens is welcome, but does not go far enough. A more extensive list has been official nomenclature of the International Union of Immunological Societies and the World Health Organisation since 1983, and is now widely accepted. This nomenclature emerged in the First Workshop on Human Leucocyte Differentiation Antigens[2], held in Paris in 1982, and was extended by the Second Workshop[3] (Boston, 1984). The report of the Third International Workshop held in Oxford in October 1986 is now being printed and a summary of the updated recommended nomenclature is available in ref. 4; lists of antibodies in each cluster will be found in refs 2 and 3.

It is not clear why you have decided to stop at CD8 rather than adopt the more extensive and growing list. And why retain interleukin-2 (why not TAC?) receptor rather than CD25? We do not discourage the use of the former, but encourage the use of the latter in conjunction with trivial names, including the name of the specific antibody in use. The reasons are more obvious in CD25 than in other cases. CD25 recognizes the putative β-chain (55K) of the receptor, and there is now strong evidence to implicate a second α-chain (75K)[5]. Use of the same chain by different molecular complexes is no longer a bizarre observation, and the workshop nomenclature attempts to avoid the attendant complications.

We were somewhat disappointed by other aspects of your policy. It has given undue weight to the reagents of two major commercial companies, rather than perhaps better ones from other companies and laboratories, or a better scientific judgement. For instance, three sets of CD1 (CD1a, CD1b and CD1c) are now recognized and both antibodies you chose as examples are representatives of CD1a. Furthermore, none of them was the first to be produced nor represents the best available. More seriously, you give TL as the mouse CD1 equivalent, when you recently published evidence that this is unlikely to be correct[6].

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1. *Nature* **325**, 660 (1987).
2. *Leucocyte Typing* (eds Bernard, A. *et al.*) (Springer, Heidelberg, 1984).
3. *Leucocyte Typing II* (eds Reinherz, E. L., Haynes, B. F., Nadler, L. M. & Bernstein, I. D.) (Springer, Heidelberg, 1986).
4. Shaw, S. *Immunol. Today* **8**, 1–3 (1987).
5. Smith K. A. *Immunol. Today* **8**, 11–13 (1987).
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## Soliton theory and Jupiter's great red spot

SIR—Antipov *et al.*[1] recently presented some remarkable results from an ingenious laboratory analogue of the shallow-water equations on a rapidly-rotating $\beta$-plane, in which an apparently isolated, stable anticyclonic eddy formed spontaneously in the presence of a mechanically driven lateral shear flow. The latter was claimed to be a 'physical analogue' of the jovian great red spot with certain advantages over other competing models, such as the one presented by us[2] a few years ago which was based on sloping thermal convection in a differentially-heated, rotating fluid. In comparing their work with our experiments, however, Antipov *et al.* wrongly concluded that our results would apply only to deep fluids ($D/L > 1$, where $D$ is the fluid depth and $L$ a horizontal length scale), and could exhibit no dispersion in eddy propagation.

Although our experiments were carried out in a container of aspect ratio greater than 1, the dynamically significant measures of that aspect are with respect both to the so-called 'Prandtl ratio of scales'[3], $f/N$ (where $f$ is the Coriolis parameter and $N$ the Brunt-Vaïsälä or buoyancy frequency[4]), and to a condition relating to the applicability of hydrostatic equilibrium. Thus, $D/L \lesssim f/N$ for the occurrence of baroclinic eddies (coincidentally placing them in a similar regime to the shallow-water eddies of ref. 1 with respect to the relevant deformation radius). A similarly scaled aspect ratio in the jovian atmosphere would result in $D/L << 1$, owing merely to the respective values of $f$ and $N$. For the applicability of hydrostatic equilibrium, a scale analysis of the vertical momentum and thermodynamic equations (A. A. White, personal communication) indicates that $D/L$ should be $<< Ri^{1/2}$ (where the Richardson number $Ri = N^2D^2/U^2$, and $U$ is a horizontal velocity scale). As Ri is about $10^2$ in our experiments, the aspect ratio used ($D/L \simeq 2.5$) is sufficiently shallow for the fluid to remain in hydrostatic equilibrium (the consequences of departures from hydrostatic equilibrium in baroclinic instability were considered by Stone[5]).

The absence of dispersion in rotating annulus experiments, suggested by Antipov *et al.*, refers only to idealized flows in systems of constant depth. Residual potential vorticity gradients arising from mean zonal flow curvature, for example, will result in practice in the ubiquitous presence of weak dispersive effects[6], while the use of sloping endwall boundaries[7] can allow a wide variation in externally imposed 'planetary' vorticity gradients analogous to the effects of spherical curvature in a planetary atmosphere. The effects of such sloping boundaries are currently being investigated in the system studied in ref. 2, and preliminary results indicate only small quantitative changes in the propagation speeds of eddies and the location of flow regimes in parameter space from our earlier work.

The application of the analogue of Antipov *et al.* to the jovian atmosphere rests principally upon the formal mathematical similarity between the shallow-water equations and those describing barotropic (or equivalent barotropic) motion in a continuous atmosphere[4]. The extension of their work to a 'baroclinic' atmosphere, discussed by Nezlin[8], using eigenfunctions of the vertical structure equation with non-zero eigenvalues, can only be regarded as partial because, if only one such mode were present, the eddy would still be incapable of transferring heat, and hence of releasing potential energy stored in the mean zonal flow (the essence of baroclinic eddy generation[4]), unless a continuous vertical phase tilt (associated with a complex vertical structure function) were present. The relative importance of barotropic and baroclinic effects on Jupiter is currently uncertain as, contrary to the apparent claims of Antipov *et al.*[1], there is little direct evidence of the mean zonal flows 'feeding' the great red spot on Jupiter and maintaining it against the inevitable effects of friction[9].

In comparing their results with other quasibarotropic models of the great red spot, Antipov *et al.* cite the soliton model of Maxworthy and Redekopp[10], which is fundamentally a weakly nonlinear asymptotic reduction of the problem to a solution of the well-known Korteweg–de Vries equation. In contrast, the observation[1] that the flow speeds in their laboratory eddies exceed the phase speed $c$ indicates a strongly nonlinear phenomenon, probably more akin to the 'intermediate geostrophic' eddies in the shallow-water numerical models of Williams and Yamagata[11,12]. Like the eddies of ref. 1, the latter also exhibit an asymmetry between cyclonic and anticyclonic eddies, arising from nonlinear divergence associated with the displacement of the free upper surface. As remarked by Williams[11,12], the applicability of the nonlinearly divergent 'intermediate geostrophic' model to a continuously-stratified baroclinic fluid remains controversial and, in any event, also raises questions as to the existence of the cyclonic jovian 'barges' and persistent cyclonic features at other latitudes[2,9]. The main point of similarity between the results of Antipov *et al.* and our own work seem to be in the way horizontal advective nonlinearities can evidently conspire to steepen eddies which arise from an instability of a mean zonal flow, resulting in compact configurations which are robustly stable against competing effects such as dispersion and