se was implicated in the increased initiation latencies. In our experiment, all conditions required the use of both proximal and distal musculature; when pointing the light pen at the distal targets, T.M. always first raised his arm from the armrest, just as he did in all other conditions. If the subsequent direction of pointing was controlled primarily by hand and finger movement, why would T.M. not adopt the same strategy (where possible) in near space? The significant difference reported between conditions 2 (far space) and 5 (near space), both of which use a light pen, is not predicted by the directional hypokinesia hypothesis. Furthermore, as we originally stated, T.M. had no difficulty touching left-sided parts of his body.

We share our critics' bemusement at our results – we were ourselves astonished to find such a strong effect. But we recommend that Mattingley and Bradshaw attempt to replicate them. We have subsequently tested two further patients with left neglect in this para-

digm – one (with a temporal lesion) showed the effect seen in T.M., the other (with an occipito-temporal lesion) did not. We do not share the scepticism of Mattingley and Bradshaw about constructing better controlled paradigms. Their point about distal versus proximal musculature, for example, could be overcome by strapping the patient's wrist and attaching a laser pointer to the back of the hand.

JOHN C. MARSHALL
PETER W. HALLIGAN
University Department of Clinical Neurology,
The Radcliffe Infirmary,
Oxford OX2 6HE, UK

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C_{60} zeolites?

SIR — Single crystals of C_{60} have been shown recently[1] to have close-packed structures, and there has been speculation[2] about the effects of pressure on this structure. I would like to draw attention to a hypothetical, high-pressure cubic crystal structure (see figure) which retains the C_{60} groups, but in which all the carbon atoms are in 4-coordination, achieved by bonding of each molecule to 14 neighbours. This framework structure is much denser than the molecular crystal and also represents a new possibility for a zeolite-type framework.

The symmetry group of molecular C_{60} is the icosahedral group I_h. If the molecules are packed in a crystal in an ordered way, the highest possible symmetry of the cluster is $T_h = m3$ (the maximal crystallographic subgroup of I_h). As the order of T_h is 24, there must be at least three distinct C-atom positions in the crystal.

In the structure shown in the figure, the C_{60} groups are arranged with their centres forming a body-centred cubic lattice, 8 of the 20 hexagonal faces being normal to the 3-fold axes of the lattice. If the polyhedra at the body centres of the cubic cell are rotated by 90° about a 2-fold axis with respect to those at the

corners, the resulting space-group symmetry is $Pm3n$ and the point symmetry at the centre of the clusters is T_h. Pairs of hexagonal faces on adjacent polyhedra now form slightly twisted hexagonal prisms. If the length of the cell edge is $a = 6.3478d$, where d is the C–C bond length on each C_{60} molecule, the shortest C–C distance between an atom on one hexagonal face and that on the opposite one is equal to d, so that 48 of the 60 atoms have four nearest neighbours. The remaining 12 atoms are a distance $1.49d$ from their mirror images on polyhedra in adjacent unit cells.

Only small shifts of atom positions (without change of symmetry) are needed to give all 60 atoms four equidistant neighbours. There are nine structural parameters (a and the atomic coordinates listed in the table), but only seven independent nearest-neighbour distances so that, after these are fixed, the structure still has two degrees of freedom. The parameters in the table were determined by fixing the bond distances at $d = 1.54$ Å (appropriate for C–C single bonds) and minimizing 'non-bonded' repulsion energies. The latter were taken to be proportional to $\exp(-\alpha r)$ where r is the separation and $\alpha \approx 3.0$ Å^{-1} for C . . . C interactions[3]. This shift produces a lattice parameter of $6.1916d = 9.54$ Å, and the shortest
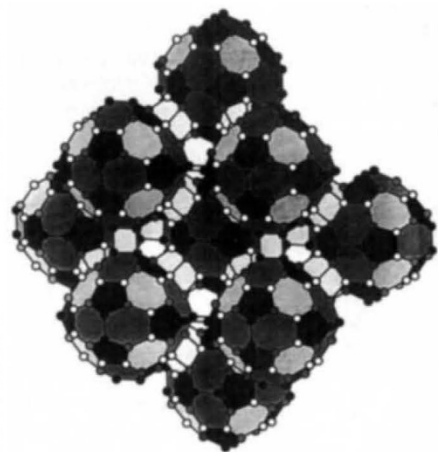
A fragment of the structure described in the text. Filled circles are C(1), shaded circles are C(2) and open circles are C(3). The lighter-shaded hexagons are parts of hexagonal prisms.

non-bonded distance is $1.32d$; the positional parameters are given in the table. If C_{60} could be induced to crystallize (possibly at low temperature) with a body-centred cubic structure of weakly interacting 3-coordinated molecules with an effective radius of 5.02 Å, one might then expect that increasing pressure would transform the structure to the 4-coordinated one with a 45% decrease in volume. The decrease in volume per unit cell is approximately 40% relative to the close-packed molecular structure. No bonds need to be broken to effect this transition.

The structure is also of interest as a means of space filling by polyhedra. In addition to the two truncated icosahedra, the unit cell contains eight hexagonal prisms (symmetry D_3), six distorted truncated octahedra (symmetry D_{2d}) and six dodecahedra (symmetry D_{2d}) with four quadrilaterals, four pentagons and four hexagons as faces. Considered as a 4-connected net, the symbols[4] of the vertices are C(1) : $4.5.6^4$, C(2) and C(3) : $4^2.5.6^3$.

Since writing this letter, the structure of a body-centred cubic intercalate, Cs_6C_{60}, has been described[5]. This has lower symmetry $Im3$ and all truncated icosahedra are in the same orientation. The optimum 4-coordinated structure with this symmetry, analogous to that shown in the figure, has very similar coordinates: $a = 6.2052d$, C(1): 0.0, 0.4194, 0.0806; C(2): 0.1275, 0.3444, 0.1445; C(3): 0.0806, 0.2557, 0.2706.

M. O'KEEFFE

Department of Chemistry,
Arizona State University,
Tempe, Arizona 85287, USA

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ATOMIC COORDINATES FOR THE NEW C_{60} CRYSTALS

Atom	x	y	z	R/d
C(1)	0 (0)	0.4192 (0.3823)	0.0808 (0.0788)	2.64 (2.48)
C(2)	0.1299 (0.1274)	0.3424 (0.3337)	0.1384 (0.1575)	2.42 (2.48)
C(3)	0.0808 (0.0788)	0.2619 (0.2549)	0.2695 (0.2850)	2.38 (2.48)

C(1) is in positions 24 *k*, C(2) and C(3) in 48 *l*. Coordinates in parentheses are for regular truncated icosahedra. R is distance from the centres of the polyhedra (at (0,0,0) and (½,½,½)) and d is the C–C bond length.