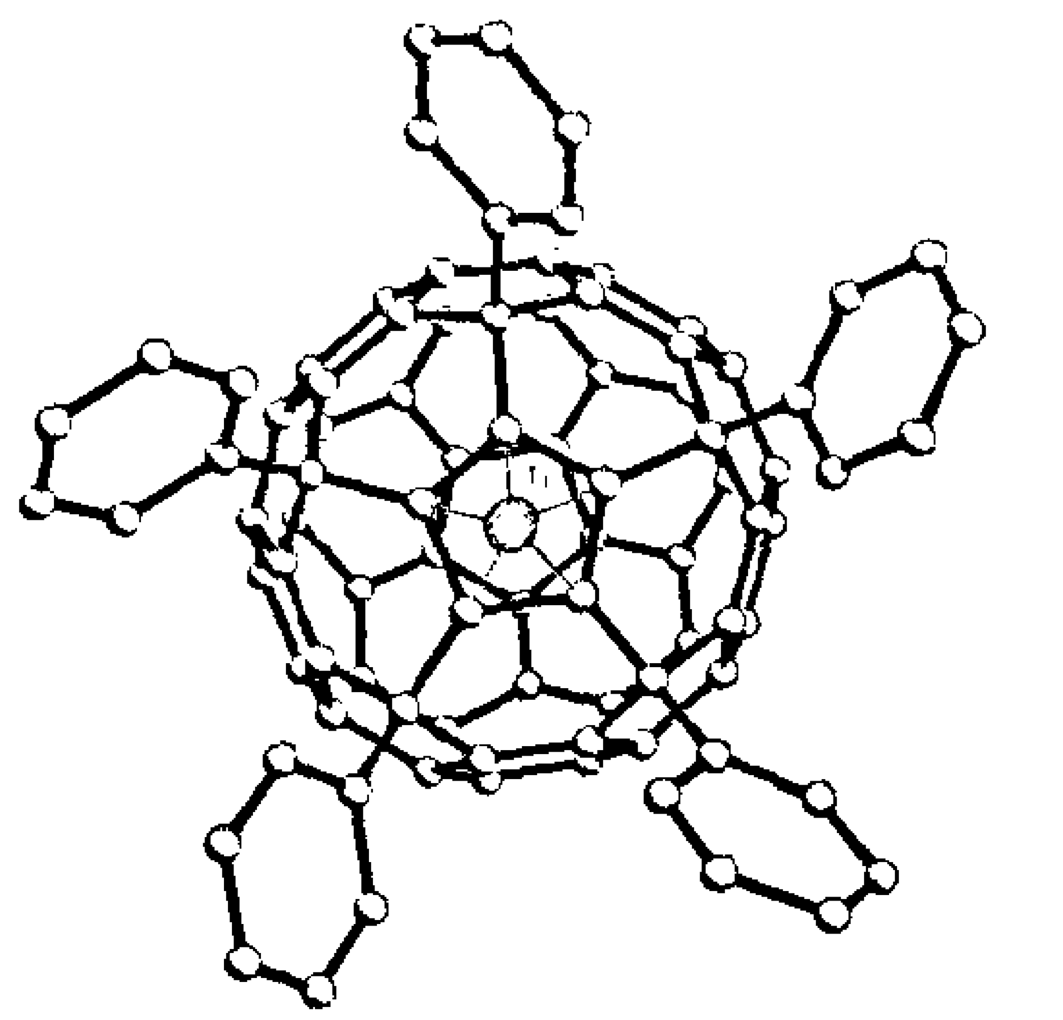

Figure 1. The top view of the molecular structure of $Tl(\eta^5\text{-}C_{60}Ph_5)$. 2.5 THF showing the C_5 symmetry.

reactions of C_{60} studied by Hirsch *et al.*[9] with organometallic reagents such as MeLi or PhMgBr yielded the monoaddition products of C_{60}, the remarkable reaction with an excess amount of the organocopper reagent $Ph_2CuMgBr$ (prepared from PhMgBr and $CuBr{\cdot}SMe_2$) readily results in the 5-fold addition product $C_{60}Ph_5H$(1) as a reddish amorphous solid in 94% yield[5]. It should be noted that, the fullerene **1** has also been prepared by Kroto and coworkers through aromatic electrophilic substitution of benzene with $C_{60}Cl_6$ followed by the reduction of the resulting $C_{60}Ph_5Cl$ in the presence of PPh_3 (ref. 10). However, the later procedure involves a multi-step synthesis which results in somewhat lower isolated yields of **1**.

The reactions of **1** with monovalent metal alkoxides LiO^tBu, KO^tBu, TlOEt and $Cu(O^tBu)(PPh_3)$ yield the respective $\eta^5\text{-}C_{60}Ph_5$ complexes **2–5** (ref. 5). A single crystal X-ray diffraction study of the thallium(I) complex **4** reveals that the molecule possesses an aesthetically pleasing C_5 symmetry with the five Ph groups forming a chiral propeller array as shown in Figure 1. In spite of the chemical structural changes around the Cp ring, the C_{60} core in **4** largely retains its original spherical symmetry. Moreover, the average C–C single and double bond lengths in the C_{50} fragment of the molecule are found to be very similar to those found in monofunctionalized C_{60} derivatives. More interestingly, the electronic spectral data of **1** and **4** reveal that the intensity of the absorption of the 50-π-electron C_{50} chromophore ($\lambda_{max} = 240$ nm, $\varepsilon = 1.1 \times 10^5\ M^{-1}\ cm^{-1}$) is comparable to that of the parent C_{60} suggesting that the electronic properties of the compounds **1–5** are similar to those of C_{60}.

The elegant approach demonstrated by Sawamura *et al.* has truly opened up the door to the exploration of C_{60} coordination chemistry beyond its previously known limits. Carefully planned research on this type of complexes might prove useful in the discovery of a new class of fullerene-based catalysts and novel materials. Among several intriguing challenges in this direction, the preparation of metallocene complexes based on C_{60} (such as ferrocene) and other double/triple decker C_{60} complexes (which would require suitable functionalization at the diagonally opposite ends of the sphere) is likely to draw the immediate attention of the synthetic chemists around the world.

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Research snippets (*Compiled by A. V. Sankaran*)

K–T meteorite relics found

While the enigma about the mass extinction of dinosaurs 65 million years ago (K–T period), whether due to terrestrial or extra-terrestrial agencies is still baffling scientists, that a 10 km wide asteroid or meteorite crashed during that period over Yucatan Peninsula (Mexico), carving the huge Chixulub crater 150 kilometers across, is not being doubted (Figure 1). Though, presumably this meteorite vapourized completely upon impacting, leaving no trace except for their extra-terrestrial signature as iridium enrichment in site-sediments, search for unburnt relics of the meteorite continued. Recently, two teams of researchers exploring for such bits, came across materials which they

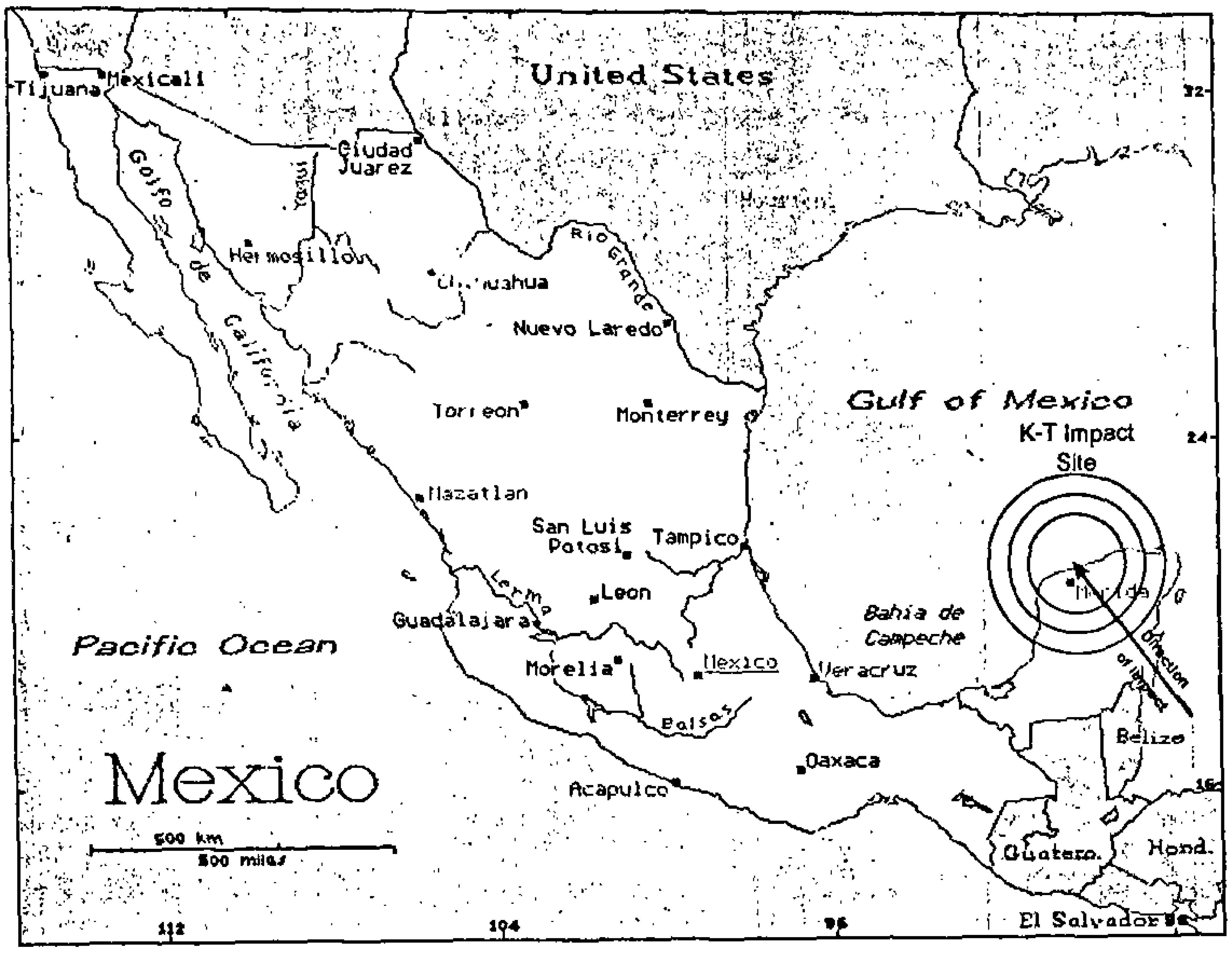

Figure 1. The K–T meteorite impact site (Chixulub Crater) in Yucatan Peninsula, Mexico.

infer were part of this K–T meteorite. One of them[1], Benjamin Schuraytz and colleagues at the NASA's Johnson Space Center, Houston, isolated from the Chixulub crater, the impact site, nuggets of nearly pure iridium enclosed inside a silicate. Apart from this, they also found iridium enriched (13.5 ppb) particles from the impact-generated melt-rock and melt-breccia and the enrichment values happened to be far above those typical of Earth's crust. They suppose that these abnormal amounts of iridium are due to admixture of meteoritic material (chondritic) into the impact melt[1], and they have estimated that at least 3% of chondritic material must have been incorporated.

The second find by Frank Kyte of the University of California, Los Angeles, has come from mid-Pacific, about 9,000 km due west of Yucatan impact site, from drill-core samples retrieved by a team drilling the ocean bed. The meteorite relic they found was a 5 mm long inclusion in a core of dark-brown clay lying at the bottom of K–T boundary layer. This inclusion contained a 2.5 mm long pebble having high amounts of Cr, Fe and Ir, in quantities characteristic of meteorites. They infer that the most reasonable source of this material, undoubtedly deposited within the K–T layers, must belong to the K–T projectile itself. This view is strengthened by the fact that this mid-Pacific site lies exactly in the path of debris that must have been thrown in a northwesterly direction when the meteorite hit Yucatan from the southeast. The impact is believed to have been made at a low angle of 20° to 30° which is considered most destructive.

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A planet rotating inside Earth's womb

Seismological and computer simulation studies about the internal structure and composition of Earth, in an effort to understand the temporal variation of its magnetic field and reversal of its poles, have brought out one of its most interesting aspect – an independent spinning of the inner core, a region about the size of the moon deep in the womb of Earth.

The structure of earth into lithosphere, asthenosphere, transition zone, lower mantle and core has been largely inferred through seismic wave studies. These waves (chiefly the P and S waves, so designated on the basis of their vibration modes) travel through the Earth with different velocities, and they are affected by the density and elastic constants of the materials through which they pass. Thus, they get deflected at surfaces of discontinuity and as a result distinct subzones have been recognized within the mantle and core regions; for example, the core is made up of an outer zone about 2270 kms thick, of molten iron mixed with lighter elements and an inner one of solid iron with a radius of 1220 kms.

According to Walter Elasser and Edward Bullard, Earth's core is a self-exciting dynamo, generating its own magnetic field[1]. Here the fluid iron is 'stirred into convective motion by heat generated from residual radioactivity in the core' and in the presence of small, stray magnetic field, this motion would produce electric currents (which in turn will create its own magnetic field) just as in a dynamo where a conductor (copper wire or disc) moving through a magnetic field of a bar magnet generates electric currents. Now this phenomenon has triggered two geophysicists, Gary Glatzmaier of Los Alamos National Laboratory in New Mexico and Paul Roberts of the University of California, Los Angeles[2–4], to predict on the basis of computer simulations studies, that