production of polymers by taking triphenylpyrylium ion (TPP^+) as the sensitizer. Using time-resolved light emission studies of the sensitizer, he explained the *in situ* generation of cationic initiators from iodobenzene (PhI). To understand the mechanistic details of the interaction between PhI and triplet state of TPP^+, electron transfer quenching reaction was studied with a series of electron donors and the theories of electron transfer applied.

Because of their extensive use in tannery, the chromium complexes attract wide interest. T. Ramasami (CLRI, Chennai) explained the photochemistry of cobalt and chromium complexes. He explained how changes in electronic structures, geometries and solvents could influence the photochemistry of these complexes. The role of charge transfer excited states leading to different types of photoredox reactions was highlighted by taking some typical model systems.

S. Mazumdar (TIFR, Mumbai) illustrated the use of picosecond time-resolved fluorescence and anisotropy decay of natural porphyrins and their zinc complexes in anionic, cationic and neutral micelles. The spectral data are consistent with the model, suggesting that the fluorescence depolarization occurs by both rotational and translational diffusion of the porphyrin inside the micelle along with the tumbling motion of the micelle as a whole.

From the surface photovoltage (SPV) studies, the reversal of the photocurrent in a liquid junction solar cell from n- to p-type characteristics was reported. This reversal is explained by preferential trapping of photoelectrons which supports the widely-held belief that charge transfer across a semiconductor–liquid interface occurs via trapped carriers. Based on SPV studies, the effect of humidity and film thickness on the ability of intrinsic semiconductors to generate photocurrent, the effect of etching on surface change and charge carrier sites have been investigated in the Weizmann Institute, Israel. G. Hodes gave a graphic account of the role of surface states in the photoelectrochemical properties of nanocrystalline CdSe films.

G. Prabhakara Rao (CECRI, Karaikudi) discussed the impact of chemically modified electrodes on many electrochemical phenomena involved in photoelectrochemical cells. When potassium hexacyanoferrate was used as the chemical modifier, a large enhancement in photocurrent was noticed. However, dark current also increased owing to the formation of reactive intermediates, thereby restricting long-term stability of these electrodes.

P. Velusamy (Gifu Univ., Japan) elaborated the technology of obtaining thin lead oxide films and their interesting semiconducting properties. The photoelectrochemical and spectral responses and solar energy conversion efficiency of films grown using different electrolytes were analysed in the light of surface morphologies of the films.

The diversified topics covered in the meeting have been successful in channelling thoughts and experiments to harness and utilize solar energy and understand several photochemical and photobiological processes.

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Anomalous diamonds

Some recent reports of diamonds in rocks of crustal origin have added to the plethora of diamond finds outside the long established kimberlite (diatremes) source. These have shaken conventional notions that diamonds are solely mantle-derived, formed under high pressure and temperature (40 kilobars and 950°C), conditions not available in the crustal environment. Porous aggregates of micrometer-sized diamond crystals – carbonados – are examples[1] of non-kimberlite source showing attributes for a crustal origin. They are considered to be products of either transformed carbon subducted into the mantle or generated during impact metamorphism of carbon in rocks. Irradiation of organic carbon by fission fragments is found capable of inducing structural re-arrangement of carbon to diamond during the radioactive decay of uranium in uraniferous sediments. Such nanometer-sized diamonds have been reported[2] from Precambrian carburanium – a fine-grained coal-like assemblage containing hydrous, carbonaceous material (with 5% uranium oxide) – occurring as brittle hygroscopic oval inclusions in pegmatite veins from North Karelia, Russia. These 40 nm sized diamonds were retrieved from the acid leached residues of the rock and their identity established by high resolution transmission electron microscopy. The find proves that 'carbonaceous material, catastrophically disrupted by energetic particles, can crystallize as diamond'[2], a process that will shortly be verified experimentally in a linear accelerator.

Diamonds of extra-terrestrial source[3,4], generated in the inter-stellar space, have been found in iron meteorites and ureilites and they are believed to have formed by vapour condensation. Clay beds from the impact crater site along the Cretaceous–Tertiary boundary (K–T boundary)[5] were found to contain minute crystals of diamond. They are not considered extraterrestrial but are supposed to be meteorite-impact induced as they show chemical and isotopic constituents typical of earthly materials. Another example of impact-related diamond has been reported[6] from the 15 million-year-old Ries Crater in Germany. This is considered to have formed 'by chemical vapour deposition from the ejected plume of the impact crater' when carbon-bearing rocks vapourized during the impact.

Among the few other recent non-kimberlite diamond finds, is one from metamorphic rocks of southwest Norway carrying crystals, 20–80 μm in size[7], generated when carbon-bearing sedimentary rocks were carried down to mantle depths temporarily during plate collision (with Scandinavia) and subsequently brought up to crustal levels. Some geologists doubt this, as they consider that crustal rocks are too buoyant to be carried down to mantle depths, and according to Stephen E. Haggerty, the well-known authority on diamonds, they were perhaps produced by a process akin to current industrial practice of making thin films of diamonds by chemical vapour deposition (CVD technique).

Even though the rather varied modes of occurrence of diamonds in nature have jolted conventional ideas about their genesis and exclusive association with kimberlites, the latter rock types still appear to be sole repositories for commercially viable crystals. Their ubiquitous existence and ability to survive over long geological time spans is of considerable significance as they can provide valuable information about impact structures and give 'access to events that occurred (and possibly carbon reservoirs that existed) in the early history of Earth when bombardment by meteorites was at its most intense'.

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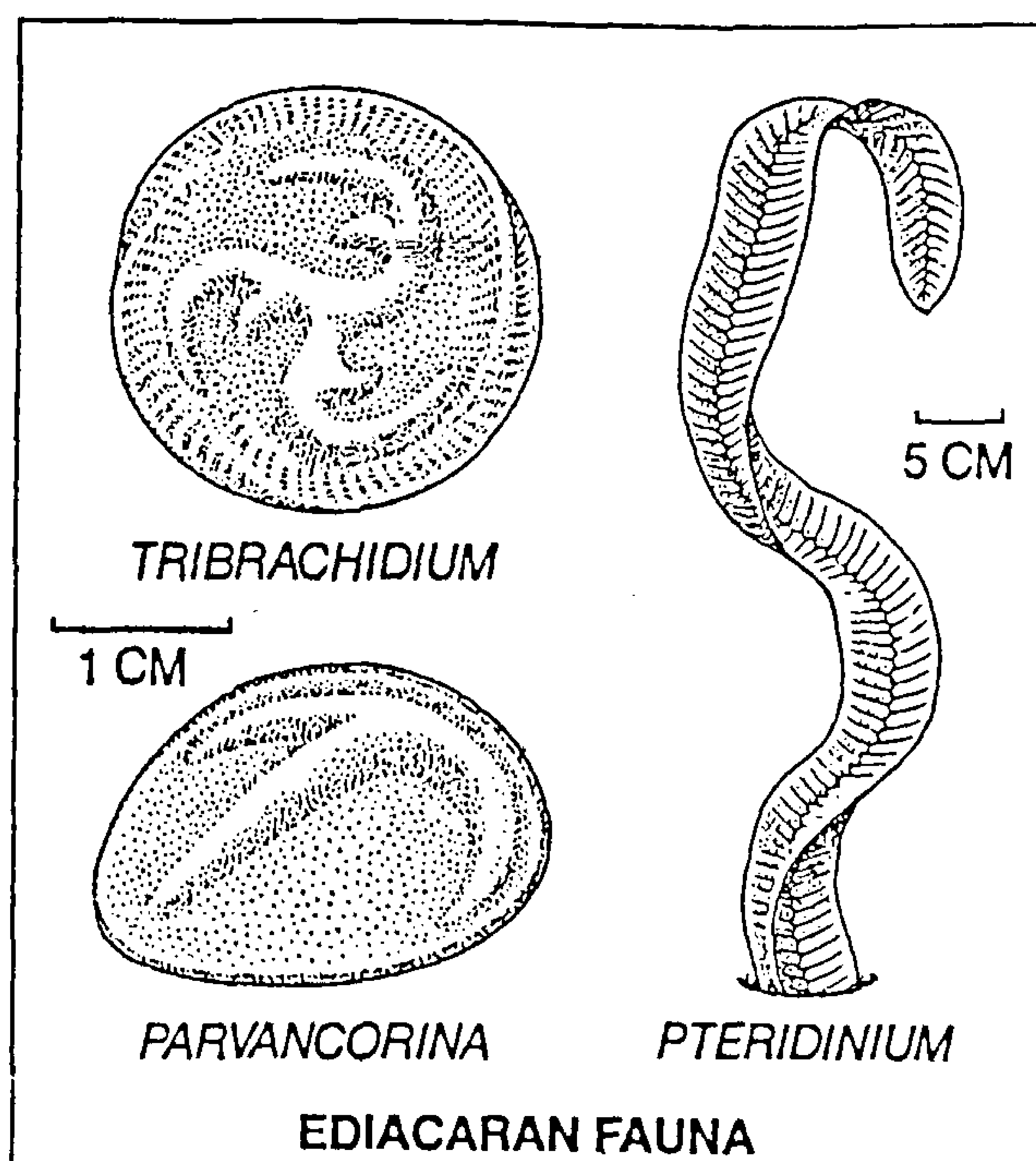
Ediacaran fossils – lichens?

In 1946, Precambrian fossil impressions of simple, soft-bodied organisms believed to be related to jelly-fish were described[1] from Ediacara Hills in Southern Australia and similar fossils were later found in Namibia, Ireland, China, Siberia, New Foundland, British Columbia, N. Mexico and in India[2–7] (claimed to date 600 million years, and hence, oldest Ediacaran fossil). These organisms were globally distributed and belong to late Precambrian period, almost after 90% of geologic time had lapsed, during which life on Earth was represented by bacteria, algae and unicellular organisms. These soon gave way to larger and complex forms which were collectively called Ediacaran fossils and the period prior to Cambrian times were dominated by these forms so much that it came to be known as 'Ediacaran' marking the early Phanerozoic (greek for visible plus animal life)[5] characterized by these oldest known multicellular life (metazoans). Martin Glaessner, 'the father of modern micropalaeontology', has provided detailed descriptions of these fossils, barring a few of which, most of them became scarce by about 500 million years. The fossils exhibited three dimensional preservation as sediment-filled moulds (i.e. body shape infilled with sediments without any trace of anatomical features) and without substantial flattening. Though palaeontologists initially classified them as animals, later researchers had expressed views that they may be plants or giant single-celled organisms or even as an unsuccessful evolutionary experiment completely different from known life on Earth. In fact they were considered enigmatic for quite a long time.

However, recently a novel idea has come up that the Ediacaran fossils are remains of large lichens which had widespread development in the Precambrian and they were believed to be living symbiotically with algae and bacteria of those times[8,9]. The animal–jellyfish connection suspected by the earlier discoverers was dismissed by experimentally proving that soft-bodied animals like jellyfish cannot leave any fossil impression as the weight of rocks piling over would have squeezed them much flatter and hence the Ediacaran fossils must have had structural strength and rigidity of the large plants having chitin. Like plants, they produced their own food and had microscopic tube-like structures similar to modern lichen filaments. These views have been discounted by other palaeontologists some of whom consider that the author had insufficient data and his conclusions based on structural strengths are flimsy as all Ediacaran fossils are merely impressions in rock and not fossilized remnants; also, their resemblance to sea-anemones (instead of jelly fish as earlier put forward) would be more apt as they had stiffer body. On anatomical grounds too, most of them



A few forms of the Ediacaran fossils.