

Amber Analysis and Palaeoentomology Laboratory

At present, amber nodules have been found in India in the Cretaceous (Rudra et al., 2014), Palaeocene/Eocene (Rust et al. 2010) and in the Miocene at Warkalli (Dutta et al., 2014) and in the North-East (Tiwari et al., 2015) and there is considerable potential of their being found in other geological levels and localities. Typically, amber analysis identifies the botanical producer, gives information of the structure of the polymer which in turn allows it to be classified in known categories. It is of interest to know that Indian Eocene amber from the Gujarat Basins is classified as Dammar Resin II, commonly known in Southeast Asia

Described for the first time in 2005 (Alimohammadian et al. 2005), amber nodules discovered from the Gujarat Lignites Mines of the Cambay and Kutch Basins, are unique in terms of the information they provide for Indian geosciences. They occur at a time when India was drifting northwards towards Asia and when global temperatures were influenced by a series of thermal events, raising global mean annual temperatures by 50 to 80 C from current values of 150C. They record a unique biota that was diversifying in the greenhouse earth at the time, these forms include a variety of plants, insects, arthropods and ostracodes preserved in three dimensional excellence. Biochemical analysis carried out by IIT Mumbai suggests that these ambers are polymerized tree resins that exuded from Dipterocarpaceae (Sal trees) (Dutta et al., 2009, 2011, 2014, Dutta and Mallick, 2017). The Indian amber deposits have commanded global attention since they are one of the few that occur during the Lower Eocene in an equatorial climatic zone. In addition, high-resolution techniques have been developed whereby it is possible to extract the fossil inclusions and study them by sophisticated instrumentations, such as scanning electron microscopy (Rust et al., 2010), confocal laser scanning microscopy (Cai et al., 2018, Fu et al., 2021), synchrotron x-ray imaging (Stebner et al., 2016) and biochemistry by mass spectroscopy methods (Beimforde et al. 2011).





Fossil arthropods and other inclusions add another significant dimension to terrestrial biotas. Amber inclusions include a wide range of organisms: fungi, testate amoeba, diatoms, algae, bryophytes comprising microbiota, stems, leaves, flowers, pollen (flora), insects, spiders and their eggs and webs, ostracodes, and a rare bird feather. Amber studies thus afford a glimpse of the past biodiversity in one of the first evolving tropical evergreen forests in the Lower Eocene and help to recreate long lost ecosystems in a greenhouse earth and paleoenvironments that interface with open oceans, lagoons and delta deposits. Several of the Indian forms represent the earliest record at the familial level and serve to trace dispersal corridors and migrations and help in the reconstruction of palaeobiogeography.

In the last 15 years or so, over 100 very high quality papers have been published on various aspects of Indian amber, many in prestigious journals such as PNAS (Rust et al., 2010), Scientific Reports (Stebner et al., 2016), American Journal of Botany (Singh et al., 2021), International Journal of Coal Geology (Singh et al., 2021) and several others (Grimaldi and Singh, 2012, Stebner et al., 2017, Engel et al., 2011, Ortega Blanco et al., 2013, Singh 2020).

To further encourage this field of Science, an amber analysis and palaeoentomology laboratory was inaugurated on 14th November, 2023 by Professor Ashok Sahni, Scientist Emeritus, Panjab University, Chandigarh. Prof. Sahni is a pioneer in the field of Indian Palaeontology who discovered the first Indian dinosaur fossil *Rajasaurus* along the Narmada River. It was his vision that paved way for such kind of new research to be established in India and speaks a lot about the hidden fossil treasures in the Indian Lignites of Gujarat. Institute's director, Professor Mahesh G. Thakkar, has also extended his full support in the establishment of the new amber laboratory and encouraging new fields of scientific research and innovation. The inauguration was done in the presence of Professor Mahesh Thakkar, Prof. Ashok Sahni, Dr, Hukam Singh, other scientists and staff of the institute on Thursday.

Amber Group, BSIP, Lucknow
Dr. Hukam Singh, Scientist- F
Dr. Priya Agnihotri, BSRA