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## Bird, flowers and pollination ecology

The recent paper by Atluri *et al.*<sup>1</sup> provides some interesting information on the pollination ecology of *Helectres isora*. Information on bird flowers, their visitors and their pollination ecology are few from the sub-continent and this paper is a welcome addition to our knowledge of such systems. However, there are a few major errors in the paper that need to be addressed. The most glaring of these is the identification of the bird pollinator. The authors refer to Quaker babbler (*Alcippe poioicephala*) as one of the pollinators, but according to Figure 1d in the article, it appears that the bird is the white-headed babbler (*Turdoides affinis*). The two are very different birds. *T. affinis* is bigger with a broader bill that can closely fit an *H. isora* flower, while *A. poioicephala* is a small bird and its bill and forehead do not fit the flower as closely as *T. affinis*. Consequently, pollination efficiency may be different between the two species. Misidentification can have important implications when it comes to conservation and in no case should be

taken lightly, especially when the pollinators can be identified by proper use of field guides.

The authors only record three avian species but a lot more insect visitors. This is very unlikely even in areas that are disturbed. Our own observations and that of Santharam<sup>2</sup> have shown that a variety of visitors visit the flowers though the species may vary from place to place. Was there then a problem with the method of quantifying visitation? One is likely to miss out on bird visits if one is close to the plant for recording insect visitors. By the way, no detailed account of how the visitation was done is mentioned. This is important in such a work as it could explain the absence of some visitors.

Reliance on non-nectarivorous birds, the authors say, is not an ideal and fitting strategy for *H. isora*. It is well documented that pollination by non-nectarivorous birds does occur<sup>3</sup>. For instance, the Canary islands which have a variety of bird flowers have no specialized pollinators and sylviid war-

blers, an insectivore species, exploit nectar and opportunistically pollinate the flowers<sup>4</sup>. Flowers such as *H. isora*, can also be an important resource for the associated visitors (see Santharam<sup>2</sup>). There is no mention of this aspect in the discussion.

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## Gold in the Meghalaya Plateau!

This has reference to the article by A. V. Subrahmanyam *et al.* (*Curr. Sci.*, 2000, **78**, 1189–1190). The occurrence of pyroclastics and dyke associated with the Lower Mahadak Formation (lower Cretaceous) on the northern bank of the Wahblei river in the Meghalaya Plateau appears to be of interest from the gold mineralization point of view.

From their studies the authors have concluded that (1) Pyroclastics were produced by explosive volcanism during the lower Cretaceous period (Rajmahal–Bengal–Sylhet volcanism); (2) Pyroclastics contain uranium with ranges from 10 to 25 ppm at Wahkyn and up to 1740 ppm at Domiasait; (3) The associated tuff beds within the

sandstone units appear to be the source of uranium.

These findings provide a geological clue to look for gold in this area. This is based on concept and ground realities elsewhere.

According to a concept, the precious metal deposits on land are actually remnants of ancient volcanics that were first

active beneath the sea<sup>1</sup>. This statement applies to all primary gold deposits in the Archean greenstone belts the world over. These greenstone are the metamorphosed equivalents of basalt, andesites, etc. of volcanic origin. The best examples in India are the Kolar and Hutti gold belts.

Some examples from ground realities are the following: (1) The uranium-bearing quartz pebble conglomerates have gold associated with them at the following places in Orissa<sup>2</sup> – Mayurbhanj district (0.2 to 0.8 g/t) and Keonjhar district (1.0 g/t). (2) In the Jaduguda uranium mines in Singhbhum shear zone, gold is an associated metal in the range of 1.5 to 4.58 g/t (ref. 2). (3) In the Chikkamagalur district (Karnataka) at the base of the Bababudan iron ore formation, uranium and pitchblende occur as detrital grains along with gold<sup>3</sup>. (4) Uranium and thorium are associated with gold in the well-known pyritiferous quartz pebble conglomerates in the Rand gold mines in South Africa. (5) Boyle<sup>4</sup> suggested uranium and gold association at several auriferous tracts all over the world. Some important areas are Canada (Au, U deposit at Claff lake, Saskatchewan), Mexico (Guadalupe), USA (Plumas

country, California), and Australia (Jubiluka U, deposit in Northern territory).

In the light of the above evidences on the common association of uranium and gold, it is suggested that in Meghalaya an attempt may be made to evaluate the gold contents also of the pyroclastics. The gold may or may not be of any economic significance, but it will confirm whether the pyroclastics are auriferous or not. Since the Atomic Minerals Division (AMD) has a regional office at Shillong, it should not be difficult to determine gold content of the pyroclastics. This will not only enhance the importance of the AMD investigation but also throw light on the source of gold in Brahmaputra river which drains the northern part of Meghalaya.

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## Reply

We are thankful to the suggestions made by J. V. Subbaraman. Though the genesis and age of the uranium deposits referred by him are different, however, association of uranium with gold is well-known. Our discovery of pyroclastics in the Mahadek Formation attributes volcanogenic character to the uranium mineralization and volcanoclastic nature to the sediments. Therefore, we also suspected the presence of gold, silver and other volcanogenic metals. We have sent some samples for analyses and the results are yet to be received.

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## RESEARCH NEWS

# Deformation-assisted percolative core formation in early earth

A. V. Sankaran

The earth was formed from accretion of bodies or planetessimals of the solar system 4.55 billion years (b.y.) ago. In course of time, these bodies melted and differentiated to form the core, mantle, crust and atmosphere. The earth's core, which is 3400 km in diameter, is essentially made up of iron, its inner 1300 km being solid and the outer 2100 km being liquid. Silicate mantle with a thin outer crust surrounds the core (Figure 1). Though many of the models advanced on the earth's evolution have helped to understand the early thermal history and

its role in the development of the internal structure particularly of the core, some aspects of the growth of the latter still remain only vaguely understood. For example, the classic view visualizes that the earth underwent homogeneous accretion, wherein the impacting silicates and metal alloys were mixed before melting and separation of core-forming elements. But, how the accreted planetessimals of silicate and metallic composition melted in the first place, and what mechanism brought about the partitioning of elements from this melt

to form the metallic core are still under considerable discussion. This is understandable since these events that took place so very early in the earth's history have left hardly any direct or unambiguous evidence. Various theories, therefore, about the earth's primordial differentiation have come mainly from experimental work on the behaviour of elements under high pressure and temperature, as well as through geochemical studies on deep mantle samples<sup>1-6</sup>. Undoubtedly these have provided insights into the physics and chemistry