Abstracts and brief versions of some talks of the Seminar Session

The biogeography of some host-specific Indo-Australian geometrid groups in relation to the break-up of Gondwanaland: trackers or fellow-travellers?

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The possibility that some Oriental groups of geometrids with relationships to Australasia were derived originally from parts of Gondwanaland that moved northwards in the Jurassic and Cretaceous is explored. Two main events could have led to this: the movement of several small terranes from adjacent to northern Australia at 165 Ma to accrete to SE Asia at 100 Ma; the movement of India from the east of Africa and Madagascar at 120 Ma to make contact with Asia at around 60 Ma.

The first episode may predate the evolution of the principal higher taxa of the Macrolepidoptera, though it is possible that the Castniidae, restricted to SE Asia, Australia and the Americas, could have been involved. The plant fossil records for the second episode, movement of India, indicate that Gondwanan groups of plants that reached SE Asia by this means are much more likely to be of African or Madagascan affinity than Australian, though the latter is not completely excluded (Morley, 1998, 2002). Morley has suggested that the Indian drift component of the current Malesian flora may be significant. The Callidulidae, with some specialization for fern-feeding, show Oriental/Madagascan affinities.

The development and subsequent persistence of biogeographic pattern that reflects such tectonic events will be constrained by several factors. Firstly the taxa concerned must be widely distributed across the components of Gondwanaland prior to the
events; this has implications concerning the geological age of the ancestral taxon. Persistence of such pattern is dependent on the extent to which it becomes confused by subsequent events, i.e. if extensive dispersal predominates over terrane fidelity.

Host specialism in herbivorous insects presents an additional constraint, in that the host plant must be present in an area before the insect can be present. The insect and host plant can be fellow-travellers on a tectonic terrane, but, in a dispersal event, the insect must track its host; it cannot precede it.

Examples of geotrid groups at a tribal level that span most of the areas of Gondwanaland include the Desmobathrini, Lithinini and Cabrini. The first tribe shows some host specialism at a generic level, and there is a major section of the Lithinini restricted to fern-feeding. There is a major group of the Cabrini that is restricted to the Rhamnaceae. In the Eupitheciini, the genus Pasiphila Meyrick is diverse in temperate Australasia, particularly New Zealand, but has a north-temperate subgenus, Gymnodisca Warren. Host records are diverse, but many Gymnodisca have been reared from Ericaceae such as Rhododendron, and the group may have tracked this host through the mountains of Malesia to as far east as New Guinea.

Potential examples of montane tracking from south to north by Larentiinae include a lineage of Poecilasthenia Warren, possibly specialist on Leptospermum (Myrtaceae), that has reached Burma, and the genera Tynpanota Warren and Episteira Warren that feed on Podocarpaceae. The ennomine genus Miliona Walker also feeds on Podocarpaceae with Araucariae. It is most diverse in New Guinea but has a number of species groups through central Malesia to mainland Asia; it is just possible that some of the more westerly groups are of Indian drift origin.

The true, robust Oenochrominae feed in Australasia on Myrtaceae and grevilleloid Proteaceae, genera with the latter habit probably forming a distinct lineage. The Oriental genus Carcinoidea Guenée is a member of that lineage; two species occur in Australasia but a pilot phylogenetic analysis has suggested those are sister-species nested within an Oriental clade, and that other Oriental clades are more basal, indicative of a west to east movement. All host records are from the grevilleloid genus Helicia, which has a similar range and, to a lesser extent, pattern of species richness to the moth genus. However, current estimates of the phylogenetic structure and range of diversification of Helicia indicate a more recent history, and the presence of grevilleloid Proteaceae in the Indian drift flora is uncertain.

Thus, whilst Pasiphila, Miliona and the true Oenochrominae may have contributed early Gondwanan components to the Oriental geotrid fauna, the first is not constrained by host specialism, the second requires testing through detailed phylogenetic analyses, and the third shows biogeographic incompatibility between moth and host. None currently shows any representation in or relationship to Africa or Madagascar.

Much of the subject matter of this talk has been published by Holloway & Hall (1998) and Holloway (2003).

References

Holloway, J. D. 2003. Biological images of geological history: through a glass darkly or brightly to face? – J. Biogeogr. 30: 165-179