

# PUTATIVE FUNGAL MIMICRY BY A HIMALAYAN TROIDINE PUPA (LEPIDOPTERA: PAPILIONIDAE)

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## INTRODUCTION

Attempting to look like something unattractive to predators is a well known survival strategy among the Lepidoptera. Although most Papilionidae do not use cryptic coloration in the adult stage, there are exceptions such as the Asian genus *Meandrusa* Moore, 1888. In the pupal stage, members of the *Papilio clytia* Linnaeus, 1758 group are known to look very much like the end of a broken-off twig (Wynter-Blyth, 1957).

Although pupae of the Himalayan Troidini have protuberances as in Igarashi (1966), yet none are known to actually resemble anything specific. It is possible to suggest that the two forms, green and brown, of *Troides aeacus* (C. & R. Felder, 1860) pupae are examples of crypsis.

## MATERIAL

On July 7, 2008, while searching for Lepidoptera larvae in a forest near Gagar (2400 m) in Nainital district of the Kumaon Himalaya, Uttarakhand, India, we came across what seemed to be a scalloped, brown fungus growing on a twig. Since it was the middle of the rainy season in an area of heavy rainfall, this

was by no means unusual. However, closer examination revealed a girdle and the outline of forewings, which indicated that it was a pupa rather than a fungus (Figure 1).

Although it looked velvety and moist, yet it was dry and brittle to the touch. Some days later, an *Atrophaneura aidoneus* (Doubleday, 1845) emerged from it.

## DISCUSSION

Fungal mimicry by Troidine pupae seems not to have been reported so far (T. Racheli *pers. comm.*). Although the pupa of *A. aidoneus* presents a hideous appearance when viewed from below, yet from above, which, one might suggest, is the view generally taken by viewers, it looks remarkably like a small brown fungus of the genus *Phaeotremella* Rea, (1912), such as one might expect in a very damp forest. In fact, we would not have given it a second glance, except that the girdle caught our eye.

When we showed the pupa to other people, both botanists and laypersons, they invariably believed that it was soft and moist and were surprised when a light

touch revealed that it was, in fact, dry and brittle, rather like a piece of dry coral.

Adam Cotton (*pers. comm.*) drew attention to the fact that when the pupa of *A. aidoneus* is less than one day old, it is bright red until it dries out and becomes brown over succeeding days. Fresh pupae like that illustrated in Figure 5 have a very strong aristolochic acid component on the surface and bright red warning colour. The smell of the acid is particularly strong before the pupa is dry, but less obvious once it has turned brown.

The jelly fungi of the genus *Phaeotremella* and related genera are parasitic on other fungi and can appear wherever and apparently whenever their host fungi grow. There appears to be no information available on the seasons at which they have been recorded in the Himalaya, so it is difficult to say whether the putative mimicry by the pupa will be effective during, for example, winter, when there are no fungi. In North America, *Phaeotremella* has been found in every month from March to November (Maryland Biodiversity Project), hence, it appears to be a fungus that can appear at any time except winter and there is no reason that Himalayan *Phaeotremella* should be any different. In the Himalaya, both the pupa and the fruiting body of the fungus are present in July.

It seems unusual that a species protected by aristolochic acids should have developed the anonymity of cryptic form and coloration in the pupal stage. Sympatric Troidini, notably *Byasa dasarada ravana* (Moore, 1858); *Byasa*

*polyeuctes* (Doubleday, 1842) and *Troides aeacus* that share a single larval food plant, *Aristolochia dilatata* in the Uttarakhand Himalaya, have rather differently coloured pupae which do not resemble fungi (Figures 2 – 8).

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Figure 1: *Atrophaneura aidoneus* pupa *in situ*; lateral view.



Figure 2: *Byasa dasarada ravana* pupa lateral view



Figure 3: *B. polyeuctes* pupa lateral view.



Figure 4: *Troides aeacus* green form pupa lateral view.



Figure 5: *A. aidoneus* on left, showing "wet" look; 2 *B. dasarada* on right.



Figure 6: *B. dasarada* on left, *A. aidoneus* on right. Both ventral views.



Figure 7: *B. dasarada* on left, *B. polyeuctes* on right. Both ventral views.



Figure 8: *T. aeacus* green form pupa ventral view.



Figure 9 : The probable model fungus, *Phaeotremella* sp., growing on a *Buddleia* bush in the same district.



Figure 10: The probable model fungus, *Phaeotremella* sp., growing on a *Buddleia* bush in the same district.