

A Natural History of



Pollination at a Shrine

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Orchids in Yunnan

YUNNAN IS AS much a center of cultural diversity as it is a center of floristic diversity. At least 25 minority groups live in these mountains at different elevations. While some customs overlap, they often speak different languages, wear different clothing, prefer different plants for traditional remedies, follow different religions and master different arts and crafts.

The Naxhi or Naxi people of China are most numerous in the city of Lijiang, located in northwestern Yunnan Province. Historically, they lived in a matriarchal society. The women continue to do beautiful embroidery, often incorporating stylized motifs of native and garden flowers. Some of the men continue the craft of masonry, producing impressive walls, storehouses and family homes. While their religious beliefs are much influenced by the Tibetan branch of Buddhism (the dominant religion in the Lijiang area is Tibetan Buddhism) many continue to practice the rituals and teachings of the Dongba, a wise man from eastern Tibet known as Dongba Shilo, whom legend has it lived in a cave about 900 years ago. Lijiang historically has been an important spot along the route used to transport tea, an essential vitamin resource for Tibetans, from China to Tibet.

On June 6, 2015, we were still in the county of Shangri-la and our botanical team was on its way to the Haba Snow Mountain (Yulong Mountain in Lijiang and the Haba Snow Mountain are sister peaks separated by the Yangtze River). We decided to stop at Baidi Village that morning to visit the site of the Dongba's major shrine. Legend suggests he'd lived above what is now the town of Baidi. I was not expecting orchids but we found plenty of them. Within a few minutes of finding these flowers, orchid pollination turned into a sacred experience.

To enter, we had to buy tickets and walk up the hill. The first part of the trail took us past tethered Naxhi ponies wearing saddles or embroidered blankets and saddlebags. The Naxhi are fine horsemen but this seemed to be a tourist photography and pony-ride opportunity. The trail of concrete and stone gave way to an arbor of native vegetation on each side,



mostly oaks and some yellow-flowering dogwoods, with enough shade to encourage various species of polypodium and maidenhair (*Adiantum*) ferns. An apple orchard was adjacent to the left of the arbor and we noted a number of trees with branches parasitized by a red-flowered mistletoe (*Loranthaceae*). While these stem parasites may lower fruit production the mistletoes are harvested and sold to agents of the herbal medicine trade.

- [1] *Epipactis mairei* growing near one of the mineral pools.
- [2] Smoky cooking fires are very common in the region. Here a group of Naxi women are preparing a meal.
- [3] Shrine viewed just beneath the plateau showing how it is encased in the mineral deposits from the water flowing through it.

Eventually, the nice path of stone and concrete gave way to a stairway of rotting logs. What I did not expect, though, was that this shrine is actually a series of natural and interconnecting mineral springs. By the time one reaches the top of the slope the additional gutters, cut to redirect water flow down the hill, are encrusted with layers of thick, white deposits so the rushing water resembles diluted milk. The pools on the plateau were quite clear or bluish and water chemistry was pure enough to support lots of tadpoles and *Spirogyra*-type algae. The vegetation around and in these pools consisted of short, scrubby willows, oaks and barberry bushes (*Berberis*) mixed with various sedges and reeds. It was here that Dr. Ren pointed out over 200 helleborine orchids in bloom. These people make little fires at the base of surrounding pine trees to perform a sacrifice, pray and eat. The trees looked surprisingly tall, thick and healthy considering what looked like years of sustained fires.

Ren and Mr. Tao went on to explore the area and chat with the Naxhi pilgrims while I remained by the pools attempting to photograph the orchids we'd found with my iPhone 6 only to find a beautiful, orange, black and gold wasp taking nectar from one of the flowers. I tried to take a photo of it but was not fast enough. Fortunately, Ren was within earshot so when I yelled he deftly caught the wasp in a little organza (BonBonniere) bag we use to isolate individual flowers used in hand-pollination experiments. In fact, this wasp was flying rather slowly and, upon closer inspection in the bag, we saw that it carried on the back of its thorax at least half a dozen pollinaria. We euthanized the insect for identification purposes and were actually able to collect a hoverfly (syrphid fly) visiting the same flowers about 10 minutes later, also carrying pollinaria. Pink-reddish veins on the surface of the labellum may lead such insects to sweet fluids secreted at the base of the hypochile.

The wasp, now pinned and labeled, remains in Ren's laboratory in Kunming. It is very difficult to have Chinese insects identified as to species in China, where entomological taxonomy is often an undeveloped science. However, a photo of the specimen reached Dr. James Carpenter at the American Museum of Natural History in New York City. He identified it as a member of the paper wasp genus, *Polistes*, and he remains relatively certain it is *Polistes tenebricosus* (Vespidae). If so, it is a new pollinator for *Epipactis*





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species, in general. While the pollination of helleborine orchids in Europe has received a lot of attention over the past 150 years, the wasps most often involved are members of the genus *Dolichovespula* (also Vespidae) (the yellow-and-black species of this genus in North America are our familiar yellowjackets) with some contributions made by *Polistes fuscatus* (northern paper wasp) and *Polistes gallicus* (Jakubská-Busse and Kadej 2011).

I suspect that a number of homeowners reading this article have had problems with local populations of paper wasps and do not care for them at all. In fact, many *Polistes* species have a consistent taste for nectar and pollinate some native wildflowers in North America including some milkweeds (*Asclepias*) (Kephart 1983) and the rare Brown's peony (*Paeonia brownii*) (Bernhardt et al. 2013). Unfortunately, we've had no success, to date, in the identification of the hoverfly beyond the family, Syrphidae.

Of course, as there are several *Epipactis* species native to China we needed voucher specimens for identification. I did not want to vandalize a religious site but tourists had already done so for us. Stems of helleborines, probably picked only half an hour earlier, could be found around the pools dumped on the hard ground

of the rocky ledge. I pressed them in my journal and sent them off to Professor Luo Yi-bo in Beijing. He identified them as *Epipactis mairei* Schltr. It's a variable and well-distributed species found in seven Chinese provinces (including Sichuan), from 3,900–10,500 feet (1,200–3,200 m) (Singchi et al. 1999).

We celebrated with a late lunch of chicken hot pot at a restaurant next to the entrance to the founder's shrine. I remained curious about what the pilgrims had said to Ren and Tao. Ren replied, "They came for the usual reasons. The men said they prayed for rain and the women said they prayed that their children will do well on college and university entrance exams," the most important exams for any young Chinese student.

Next: Poachers at 11,000 feet (3,300 m)!

References

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- [4] View from the Shrine looking down on the adjacent village of Baidi.
- [5] Run off channel from the mineral pools. Over centuries the dissolved minerals in the water precipitate forming the white stone deposits coating the channel.
- [6] Portion of a mineral water pool. *Epipactis mairei*, reeds and other plants colonize the edges.
- [7] *Polistes* wasp collected after drinking nectar from the flowers of *Epipactis mairei*. Note the large numbers of pollinaria on the back of her thorax.

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