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A new pollinating seed-consuming mutualism between *Rheum nobile* and a fly fungus gnat, *Bradysia* sp., involving pollinator attraction by a specific floral compound

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Pollinating seed-consuming mutualisms are regarded as exemplary models for studying coevolution, but they are extremely rare. In these systems, olfactory cues have been thought to play an important role in facilitating encounters between partners. We present a new pollinating seed-consuming mutualism from the high Himalayas between the endemic herb, *Rheum nobile*, and a fly fungus gnat, *Bradysia* sp. Seed production resulting from pollination by *Bradysia* flies and seed consumption by their larvae were measured to determine the outcome of this interaction. Floral scent analyses and behavioural tests were conducted to investigate the role of olfactory cues in pollinator attraction. *Rheum nobile* is self-compatible, but it depends mainly on *Bradysia* sp. females for pollination. Seed production resulting from pollination by adult flies is substantially higher than subsequent seed consumption by their larvae. Behavioural tests showed that an unusual floral compound, 2-methyl butyric acid methyl ester, emitted by plants only during anthesis, was attractive to female flies. Our results indicate that the *R. nobile*-*Bradysia* sp. interaction represents a new pollinating seed-consuming mutualism, and that a single unusual compound is the specific signal in the floral scent of *R. nobile* that plays a key role in attracting its pollinator.

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