

Schismatoglottis

– Terrestrial Forest Aroids in Sarawak

This is the second in a series of occasional articles aiming to introduce the main groups of aroids in Sarawak (for the first article see *Gardenwise* 23(2004): 11-13).

The aroids (family Araceae) are pre-eminent among the herbaceous flora of Sarawak. Among them, species of the genus *Schismatoglottis*, the vegetatively similar genus *Homalomena*, and the horticulturally popular genus *Alocasia* are among the most abundant and diverse of the forest floor aroids.

Schismatoglottis is a predominantly old world tropics genus of more than 100 species of terrestrial herbaceous plants adapted to constant levels of soil and atmospheric moisture (so-called mesophytes). Some adapt to the flood zones of tropical forest streams (such plants are termed rheophytes). Others very rarely grow as swamp plants in full sun (helophytes). The primary distribution of this genus is in Borneo.

The generic name *Schismatoglottis* is from the Greek *schisma*, *schismatos* (separating) and *glōtta* (tongue) and refers to the variously deciduous upper part of the spathe (or spathe limb) that is a feature of most species.

In its typical form, the spathe in *Schismatoglottis* is differentiated into a lower persistent portion enclosing the female zone of the spadix and an upper ephemeral spathe limb subtending the male flower zone and terminal appendix. The point of differentiation is usually marked by a constriction. During flowering the spathe undergoes a series of movements, including inflating and



Schismatoglottis species typically have the spathe limb shedding during anthesis (flowering time)

spreading of the upper and lower spathe, linked to managing pollinators during the various fertile phases of the flowers.

Spadix structure in *Schismatoglottis* is complex. Broadly it is divided into a lower female flower zone, a middle male flower zone, which may or may not be separated from the female zone by a sterile portion, and usually a terminal sterile appendix.

The female flower zone is often fused for up to two thirds of its length to the lower spathe, though in many species it is free. The female flowers



Spadix of *Schismatoglottis* showing the female flower zone partly fused to the spathe

are often intermixed by irregularly arranged sterile male flowers. In many species these sterile structures are confined to a basal ring or to a single row along the join between the spathe and spadix.

The male flower zone of *Schismatoglottis* consists of massed stamens not arranged or orientated into discrete male flowers – in marked contrast to *Homalomena*. Stamens are generally truncate and raised on short filaments or occasionally stalkless with the filaments often but not always partially joined into small groups of two or three.



Spadix of *Schismatoglottis maelii* (left) and *Homalomena lancea* (right). Note that the stamens of *Schismatoglottis* form a compact mass whereas those of *Homalomena* are arranged into discrete flowers

Schismatoglottis wallichii sheds the spathe limb by splitting into regular pieces that adhere to one another and then contract upwards so that the spathe limb is drawn up the spadix, rather in the manner of an Austrian blind, before falling in a loosely coherent unit. *S. wallichii* is unusual in the Calyptrata Group by virtue of the spadix fertile to the tip.



There are six informal taxonomic groups of *Schismatoglottis* based on shoot architecture, spathe structure, the structure of the petiolar sheath and the means by which the spathe limb is shed. Four of these groups are present in Sarawak and discussed here.

and appendix (if present) exposed. However, other spathe senescence types do occur in this group, but all show lateral growth of new shoots from the base.

Calyptrata Group

Species closely allied to *Schismatoglottis calyptrata* have the shoots not renewing growth after flowering. Instead new lateral buds will grow from the base, while the rest of the mature shoot will die (like banana plants). Species in this group have the spathe limb falling just prior to the male flowers shedding their pollen, abscising cleanly at the top of the lower spathe. The spathe limb falls in a single piece, or after breaking into regular or irregular pieces, while the tissue is still fresh, leaving the male flower zone



A post-floral shoot of *Schismatoglottis muluensis* (a close ally of *S. calyptrata*) renewing from lateral buds low on the shoot



Schismatoglottis wallichii (above and below)

Schismatoglottis motleyana is notable for the spathe shedding in a single piece but not before the interior epidermis has begun to slough away in a series of rectangles and squares. *Schismatoglottis clarae* is so far unique in the Calyptrata group by the spathe limb melting into a sticky paste that then dries onto the spadix before being shed.



Schismatoglottis motleyana

The widespread but never abundant *Schismatoglottis longifolia* (one of only three *Schismatoglottis* species co-present in Peninsular Malaysia and Borneo) has the spathe limb barely opening and then persistent after flowering before gradually degrading and falling while still clasping the spent parts of the spadix. The clustered, nodding inflorescences and infructescences are diagnostic for this species.



Schismatoglottis longifolia

Asperata Group

It is this group that shows the most variation in spathe structure and movement, although all species so far studied are notable for the open-topped (not closely constricted) persistent lower spathe during the maturation of the fruit.

Species most closely allied to *Schismatoglottis asperata* have the spathe inflating and the limb gaping when the female flowers are active, then opening more or less wide as the male flowers shed their pollen. All species in the group renew growth after flowering from a bud near the tip of the active shoot.



Schismatoglottis asperata. Inflorescence (left) at end of male flower activity (note: Spathe limb beginning to melt)



Schismatoglottis clarae



Schismatoglottis longifolia post flowering with the spathe limb and spent parts of the spadix fallen. Note the nodding inflorescences and developing fruiting heads



Schismatoglottis asperata at early fruiting stage showing the open persistent lower spathe



Schismatoglottis jelandii. Inflorescence at the early stage of male activity with wide-open spathe limb

Species of the complex around *Schismatoglottis multinervia* have a thick-textured spathe limb that is green outside, but glossy and dark coloured inside. The spathe limb inflates and gapes slightly when the female flowers are active. This then splits longitudinally into two or more strips when the male flowers begin to shed their pollen. So far as is known, species in the *multinervia* complex are restricted to limestone and are all locally endemic.



Schismatoglottis multinervia

Species of the *Schismatoglottis patentinervia* complex are striking not only for their distinctive erect shoots with strap-shaped leaf blades and broad-winged petioles, but also by the inflorescences carried deep within the shoot tips such that the lower spathe is obscured by the leaf bases. The female flowers become receptive when the spathe inflates and the spathe limb gapes slightly.



Schismatoglottis sp. aff. *patentinervia* at early male flower activity. Note the inflorescence buried deep in the shoot apex

The *Schismatoglottis nervosa* complex is particularly interesting in that all species are strongly aromatic when crushed, a feature more often associated with *Homalomena*. The *nervosa* complex is notable for the spathe limb mostly liquefying into a mucilaginous mess without first breaking into pieces.



Schismatoglottis nervosa after male flowers have shed their pollen; note that the spathe limb has melted completely

Species allied to *Schismatoglottis conoidea*, aside from distinctive elongated shoots giving rise to plants with a straggling habit, have the spathe limb hardly opening and long persistent into the male flower phase, before shedding in pieces. The spathe is also notably thick and glossy as opposed to the rather spongy texture of species closely allied to *S. asperata*.



Schismatoglottis conoidea at late female anthesis. Note the thick spathe limb



Schismatoglottis maelii

Multiflora Group

The Multiflora Group has vegetative shoots with apical portion renewing growth at flowering. A greater proportion of the petiolar sheath is free and usually (but not exclusively) the spathe limb is shedding in a single piece when still fresh. Typical of the group is *Schismatoglottis maelii* from the Bau area.

The Multiflora Group is of particular interest in studies on adaptation to rheophytic habitats (i.e. tropical forest streams habitats) and the evolutionary study of the Schismatoglottideae.

Tecturata Group

The Tecturata Group comprises of allied species (e.g. *Schismatoglottis tecturata* and *S. petri*) where the foliage leaves alternate with reduced

leaves. The spathe has only the marginal and distal parts of the spathe limb withering after flowering while the remainder persists well into development of the fruits. Besides the above two species, a further species, *S. jipomii* has been described for the group, which has the spathe limb falling fresh from the constriction and falling in a single or only a few pieces.



Schismatoglottis jipomii



Schismatoglottis tecturata

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