Floral morphology of the *Polystachya* Hook. (Orchidaceae) in Nigeria.

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Abstract

A study of the floral morphology of the 32 Polystachya Hook. species in Nigeria, all occurring in the wild, was undertaken in search of simple, non-technical characters for their identification. The study has revealed that each lip is distinctive and can be recognized on the basis of their macroscopical and microscopical attributes.

Additional 8 new records of species for Nigeria, 4 of which were new for West Africa, were included in the study. *P. cooperi*, with large, showy, dense and copious flowers could be explored for domesticaion. Poor representation of the herbaria specimens for some species suggests that some of them are actually rare and require urgent conservation attention before they are lost to science and horticulture.

Introduction

Polystachya Hook. is one of the largest genera in the Orchidaceae, comprising over two hundred species (Sanford, 1968). Hutchinson & Dalziel (1958-72) listed fifty-seven species for West Tropical Africa, with Nigeria having 24 species.

The greatest challenge to the utilization of the orchids of Nigeria, for both scientific and aesthetic purposes is the absence of simple identification keys devoid of the usual highly technical details of taxonomy. The existing keys are too technical to use by non-taxonomists, such as foresters and horticulturists. Segerback (1983) described 104 species of orchids for Nigeria, but Jayeola (1991) elsewhere has enumerated over 400 spp. for Nigeria.

Whereas there is little information about the orchids of Nigeria, in other parts of the tropical land, such as Hawai, Malaysia, Singapore and Thailand, orchids contribute immensely to the national economy.

Sanford (1970) and Hunts (1969) listed reasons why orchids in general should be conserved. The growing of orchids for cut-flowers and for plants is a large scale industry in Singapore, Hawai, Australia, United States, Europe and kenya Sanford (1968).

There is a great deal of variation in the floral structure of the *Polystachya* to the extent that most species can be recorgnized on the basis. the flowers are known to vary with respect to colour, size and shape. Variations among spp. are high but low within spp. Previous literatures on the use of lip show that they are of different sizes and shape.

It is the aim of this study to study in great detail, the structure of the flower of the *Polystachya* species of Nigeria, especially the dorsal petal or the lip, with a view to generating attributes of taxonomic importance. Since the work of Hutchinson and Dalziel (1958-72), several new records as well as concepts have been described in West Africa.. It is also the aim of this work to include these new records and concepts in the study. The characters generated from such study could then be used to describe each species in detail. All these will assist amateurs and non-orchid specialists to identify orchids based on a set of simplified, non-technical characters.

Materials and methods

Orchid flowers were obtained from two sources: Fresh flowers were obtained from the Orchidarium, *in situ*, while dried flowers were collected. *ex situ*, from Botany Herbarium (IFE). Ile-Ife. List of the specimens is provided in Table 1.

Fresh flowers were dissected to expose the floral segments and dorsal petals or lips were excised. Each lip was viewed under the scanning power of the microscope to study the morphology. Preparation of dried herbarium specimens for study required boiling the flowers in Ammonium Chloride (NH_4Cl) solution for thirty minutes to revive the tissues of the lips for detailed study under the microscope. The lips were then left to cool for two to three hours, after which they were dissected in the laboratory for examination. All the species studied are listed in Table 1. All names are according to the Flora of Tropical West Africa (Huthinson and Dalziel, 1958-72).

Dissecting Micrsocope equipped with WX – 18mm biocular micrometer was used for observation. Measurements were made in millimeters (mm). Detailed drawings were also made at X2 magnifications for all

tissue.

The lengths and breadths of lips and the lengths of mid-lobe and lateral lobes were measured with the aid ofdissectingmicroscope.

Representative specimens studied

Names of 28 representative specimens studied are according to the *Flora of West tropical Africa* (Hutchinson and Dalziel, 1958-72). However, 4 speciesare new to West Africa, namely, *P. laxiflora*, *P. remulosa*. *P. odorata* var. *novum*, *P. camaridiodes* and *P.* sp. *novum* and as such they have not been listed in any West African floral before this study. The identification of these 4 specimens was based on herbarium materials which Kew had already confirmed and deposited at the FHI and IFE (all abbreviations are according to Holmgren *et al*, 1990). Another 4 species, namely, *P. sacata*, *P. bifida*, *P. adansoniae*, *p. tesselata*, *p. kamerunensis* and *P. polycheatae* are all new records for Nigeria, having not been previously recorded before this study.

Table 1. Graphic list of species of *Polystachya* spp. in Nigeria

1 *p. galeata*, 2 *P. stricta*, 3 *P.elegans*, 3 *rhodoptera*, 4 *P. golugense*,
5 *P.odorata* var. *odorata*, 6 *p. odorata var. orosun*, 7 *p. odorata var. trilepis*,
8 *p. mukandensis*, 9 *P. adansonia*, 10 *P. orsun var. novum*, 11 *P. alpina*,
12 *P. paniculata*, 13 *P. colluniflora*, 14 *P. dolichophylla*, 15 *P. polycheate*,
16 *P. coriscensis*, 17 *P. camaridiodes*, 18 *P. albescens*, 19 *P. paniculata* subsp.
novum 20 *P. cooperi*, 21 *P. supfiana*, 22 *P. sp.novum*, 23 *P. sacata*, 24 *P.*
bifida, 25 *P.rhodoptera*, 26 *P. affinis*, 27 *P. tesselata*, 28 *P. laxiflora*, 29 *P.*
subulata, 30 *P. fusiformis*, 31 *P. modesta*, 32 *P. remulosa*.

Representative specimens studied

Table 1. Representative specimens of the *Polystachya* species in Nigeria

1. *P. galeata* Brenan 9116, Okomu F.R., Beni
FHI 227738a Keay Wright 128, Ajagbodudu, Sapele
Talbot 3725 Degema Coooper 82, Ogoja Plain FHI 25304 Keay Coombe 151
FHI 22429 Keay, Eleyele, Ibadan

2 *P. stricta* Rolfe Winbush 611: King 350, Manbia Plateau.

3. *P.elegans* FHI 25376 Keay Sankwala, Ogoja .3cm

4. *P. golungensis* Richb.f. King 22, Kogin Delli, Zaria Prov.

G.V. Summerhayes 146, Kaciya, Zaria Prov. FHI 22712 Keay, Olokemeji F.R
Abeokuta Keay 28294 Aponmu, Akure F.R. Ondo FHI 25281 Savary & Keay,
Obudu

5. P. oderata *var.* odorata *Barter 1483, Onitsha 0.5cm*
Kennedy 1686 Sapoba Richards 3409, Shasha F.R. Ijebu FHI 33176 Onochie
Orukini to Unyene, Eket FHI 33209 Onochie Lower Enyong F.R. Itu.

7. P. odorata *var* trilepis *Sumerh. FHI 20729 Janes, Mt. Orosun, Idanre,*
Ondo. FHI 21559 Keay & Onochie FHI 3374 Symington.
FHI 21559 Keay & Onochie FHI

8. P. mukandaensis *De Willd. FHI 22410 Keay, OlokemejiF.R. Abeokuta*
Thomas 1902 Onika Ofene FHI 6128 Janes, Onitsha Talbot 861, Obun.
Cooper 80, Obu... Scarp, ogoja

9. *P. adansoniae* Richb.F. FHI 40169 Onochie, Niger Prov. Gwari, Born Sanford WS/216a, 221/66 Boyogbe, 5Benin, Province; FHI 25317 Ejiofor Ogoja Province FHI 22438 Keay Okomu F.R., Benin Prov.Talbot 867, 927 Kundene Obari.

10 P. orosun var. novum. Sanford 4123, Orosun Peak, Idanre

11. *P. alpina* Lindl. Talbot 835, Oban Niagi.

12. *P. paniculata* (SW.) Rolfe; Keay, FHI 25371, Akure F.R; Ejiofor FHI24653; Thomson FHI 1509, Amedzofe; Ngogi, FHI. 15341.

13 *P. calluniflora* Kraenzl. WS 3541 IFE

14. *P. dolichophylla* Schltr. Keay 39, Nindam F.R. Zaria FHI 26118 Latilo, Osun F.R. Ijebu Prov. FHI 19543 Janes, Akure, F.R. Ondo FHI 3373 Symington, Mt. Orosun, idanre Hills, Ondo.

15. P. polychaete *Kraenzl. Talbot 927, 928 Oban*

16. *P. coriscensis* Richb.f Sanford ws?185/66, Benin Prov. Sapoba

17 P. camaridiodes *Summerh. Wright 101, Calabar*

18 P. albescens *Ridl. WS 423 (IFE).*

19 P. paniculata *(SW.) Rolfe subsp.* novum

20 P. cooperi *Summerh. FHI 15190; WS 5458 IFE.*

21 P. supfiana Schltr. Talbot 440, Kwa F. Oban, FHI 3306, Eket; IFE WS 491/66. **Sapoba IFE.**

22 *P. sp. novum* WS/443/66Sapoba F. R.

23. *P. saccata* .V. S. simmerhayes 90 Kagarko, Zari *FHI 37620 Keay & Janes Gimi River F.R. Zaria*

FHI 37639 Keay & Janes Sanga River F.R. Zaria

24. *P. bifida* summerh.IFE WS/5990, WS/199/66 Sapoba F. R.

25. *P. rhodoptera* Rchb.f.

26. P. affinis Lindl. Burtt B27, Abeokuta to Ijebu Ode FHI24666 Keay Usenigbe F.r. Sapoba FHE 22714 Keay, Owo, Ondo Prov. Talbot 3776, Ohbe, Degema, Randole Barter 1863,Onitsha

27. P. tesselata *Lindl. King 54, Kushanka, Zaria Prov. Elliott 80, FHI 25363 Keay Akure F.R. Ondo FHI 25344 Ejiofor, Sonkwa Ogoja FHI 33190 Onochie, Stubbs Creek F F. R. Eket FHI 13348 Keay, Calabar*

28. *P. laxiflora* Summerh. FHI 1366 !, Ws/1521/65 Idanre Hills

29. *P. subulata* Finet FHI 22898 Keay Ribaka F.R. Zaria Pror. *FHI 37667 Keay, Mangu F.R. Plateau Province, Summerhayes 91, Kaliy Zankwa Zaria, Richb.*

F. Talbot 440 Kwa. R(SW.) Talbot 3 306 Eket

30 P. fusiformis *(Thou.) Lindl. IFE WS/5668*

31. P. modesta *Richb. F. Cole 13, Zaria king 31, Mongu F.R. Plateau Province. FHI 22443 Keay, Sanga River F.R., Zaria, WS/1848/65 Agodi Gate, Ibadan.*

32. P. ramulosa *Lindl. Sanford Ws/184/66 Benin prov. Sapoba* Talbot 3647, Oban.

Results

The study of the representative specimens from the herbaria as well as collections from the wild revealed 32 *Polystachya* species for Nigeria. There is no record of any of the species under cultivation. Only 24 species had previously been reported for Nigeria, 8 species represent entirely new records for the orchid flora of Nigeria as indicated in the list of the representative specimens. The morphology of the lips of the 32 species of *Polystachya* studied are best described by figures 1-32. Figure 33 represents the chart of staded column of length--breadth of all the 32 lips reported in this study. The lips vary in such aspects as the length, breadth, shape, vasculature, margin, lobes and apex. Lips are either flat, broad or spreading; lobes vary from indistinct as in *P. paniculata, P. golugensis* and *P. sacata* and to well developed condition as in *P. galeatea*, and *P. cooperi*. There is broad similarity on account of venation in Figs. 1-10; while the middle lobes are free in Figs. 11-20; no specific pattern dominates among species depicted by 21-32, variation is high in this group, thereby making them to be distinct. Smallest sizes of the lips are found in *P. ramulosa, P. paniculata, P. golungensis* and *P.* sp. *novum while* largest dimensions were found in *P. cooperi, P. alpina, P. bicalcarata and P. galeata.* Shapes also vary a great deal, with each species being distinguishable from another. For example, *P. paniculata* are not well developed (obscurely 3-lobed); *P. alpina* is nearly quadrate; all other species of *Polystachya* have their lips 3-lobed. The lip of P. laxiflora, P. affinis and P.sp nov. are pubescent but other lips are not pubescent. All the lips have their margins entire except the lips of *P. odorata* var. *odorata, P. odorata* var. *trilepisis* and *P.* sp. *novum* with crenate margins. For example, the lip of *P. odorata* var. *odorata, P.odorata* var. *trilepisis* and *P.* sp *novum*, are crenate and they also belong to Polystachya section. The apices of the midlobe and lateral lobes and the position at which they are lobed are different from species to spieces. The apices of the midlobe and lateral lobes and the position at which they are lobed are different from species to spieces. The margin of the lip of *P. subulata* and *P. albescens* are entire and their lips are fleshy (coriaceous) and they both belong to the section caulescents. The lips of *P. pariculat, P. rhodoptera, P. elegans, P. coriscensis, P. paniculata P. rhodoptera, P. elegans P. coriscensis, P. collumiflora, P. ramulosa, P. subulata , P. supfiana* and *P.* sp *novum* have no callus (?), all the other species of Polystachya have callus in their lip. The lip of *P. paniculata, P. albescens, P. alpina, P. supfiana* and *P.* sp *novum* are clawed while in others claws are absent. The lips of *P.albescens, P. laxiflora, P. rhodoptera, P. alpina, P. odorata* sub *novum, P. dolichophylla, P. subulata, P. camaridiodes* and *P.* sp. *novum* are punctate other lips are of various shapes. The lips of *P. paniculate, P. albescens, P. eoriscensis, P. odorata* var. *odorata. P. odorata* subsp. *novum*. In *P. dolichophylla, P.* affinis, *P. camaridiodes* and *P.* sp. *novum* are lobed at the middle while the lips of *P. albescens P. rhodoptera* and *P. calluniflora* are lobed at lower 2/3. The remaining species of *Polystachya* have lips lobed at upper part, in some cases occurring close to the apex, for example. *P. egans* and *P. alpina.*

The Lips are variously thickened and tectured, being coruaceous in *P. alpina* and *P. supfiana* while in *P. laxiflora, P. ramulosa, P. oderata* v *oderata, P. subulata* and *P. camaridiodes* it is transparent or membrancus. The lips of other species are succulent. The margins of the lips of *P. ramulosa* and *P. camaridiodes* are in-curved below while others are straight.

The lips of *P. albescens, P. laxiflora, P. oderata*, var. *odorata, P. oderata* var. *orosun* and *P. sublata* are as long as wide while the other lips are longer than wide while others are opaque. Apices of the midlobe of *P. laxiflora, P. oderata* v. *trilepisis* and *P. subulata* are mucronate whereas the apices of midlobe of *P. coriscensis, P.alpina* and *P. calleniflora* are cuspidate, other lips are such as those of *P. paniculata* , P. *albescens, P. ramulosa* and *P. camaridiodes* have the apices of their midlobe acute. The apices of the lateral lobes of the lip of *P. albescens, P. laxiflora, P. rhodoptera, P. caltniflora, P. ramulosa, P. odorata* var.

trilepisis and *P. supfiana* are acute while the other lip have apices of their lateral lobes sub-acute to round.The lip of *P.* paniculata, *P. albescens*, *P .cooperi* and *P. subulata* are divided into many cells other lips of *Polystachya* species studied are with no cellular division. (Table 3).

Figure 33 represents the chart of staded column of length – breadth of all the 32 lips reported in this study. The staded column compares the contribution of length and breadth to the gross morphology of the lips. It was observed that *P. cooperi* had the largest lip size of *Polystachya* species of Nigeria. Other relatively large lips in the *Polystachya* were observed in *P. stricta* , *P. odorata var. orosun*. Figure 33 also reveals very small lip sizes of species such as *P. alpina*, *P. albescense*, *P. supfiana*, *P. sacata*, *P. camariodes*, *P. remulosa*.

Discussion

This study has shown that the lip is a highly variable part the orchid flower. The variations observed in the different flowers conform with known classifications of the *Polystachya*, such as Hutchinson and Dalziel (1958-72). It is of interest to note the *Polystachya* species tend to fit into their traditional sections established by Kraenzlin (1926). It is now known that each species of *Polystachya* has a unique set of characters and there is the practical possibility of using these characters to identify each species in the field and in cultivation. Every species of *Polystachya* is morphologically different from the other, to the extent that they can be readily identified based on the structure of the lips.

Hitherto, 24 species of *Polystachya* were recorded for Nigeria, this work has provided information on an additional 8 species, held in folders of standard herbaria such as FHI, IFE and UCI/UIH, out of which 4 species are new to West Africa.

At present, there is no known effort aimed at the conservation of the orchids of Nigeria in general and the *Polystachya* in particular, either at institutional or private level. That representative specimens were not available for some species suggests that they are rare. Such species may become threatened or endangered unless urgent conservation steps are taken before their natural habitats are destroyed for industrial and agricultural purposes.

The generally small size of the *Polystachya* flowers could be a limitation to its domestication, except *P. cooperi*, which has a distinctly large flower. However, most of them are able to maintain a great deal of vegetative growth and immense luxuriance for most part of the season. Sanford (1970) observed that the orchids of Nigeria are beautiful in their natural state, and from this stand point they are important to man as his valuation of aesthetic enjoyment, suggesting that the orchids of Nigeria are of theoretical and aesthetic interest only. This potential is however limited by the inadequate information on the biology of the species and their requirements for growth in the wild. At present, there is little or no information on the more than 400 species of the wild orchids of Nigeria. To be able to exploit the great horticultural potential of our orchids, we need to provide basic information on each of them or at least, groups of them.

Graphic listing of species of *Polystachya* in Nigeria.
1 *p. galeata*, 2 *P. stricta*, 3 *P.elegans*, *rhodoptera*, 4 *P. golugense*,
6 *P.odorata* var. *odorata*, 7 *p. odorata var. orosun*, 8 *p. odorata var. trilepis*,
9 *p. mukandensis*, 13 *P. paniculata*, 14 *P. colluniflora*, 15 *P. dolichophylla*, 16 *P. polycheate*, 17 *P. coriscensis*, 18 *P. camaridiodes*, 19 *P. albescens*, *novum* 20 *P. cooperi*, 21 *P. supfiana*, 22 *P. sp. novum*, 23 *P. sacata*, 24 *P.*
bifida, 25 *P.rhodoptera*, 26 *P. affinis*, 27 *P. tesselata*, 28 *P. laxiflora*, 29 *P.*
subulata, 30 *P.fusiformis*, 31 *P. modesta*, 32 *P. remulosa*.

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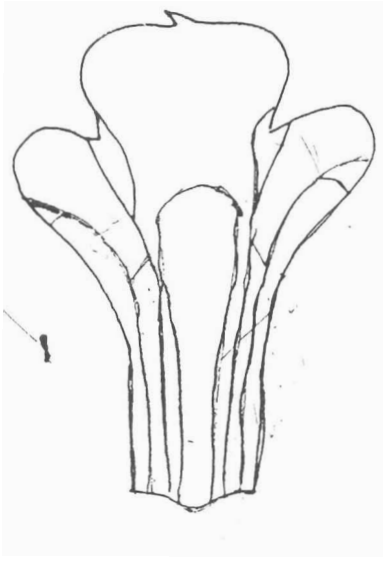
Figure 33. Length in relation to breadth of lips of the of Polystachya species in Nigeria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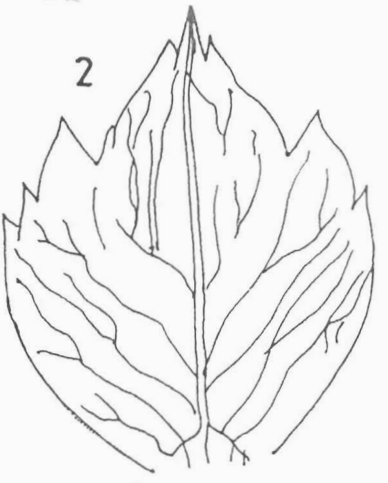
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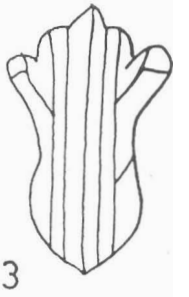
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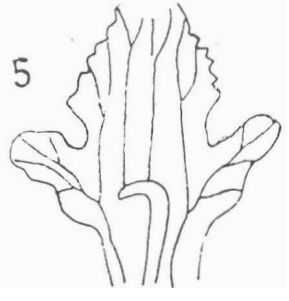
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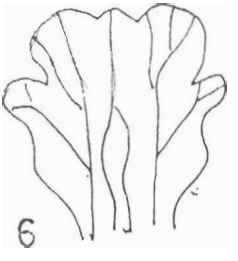
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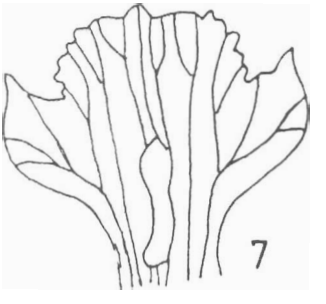
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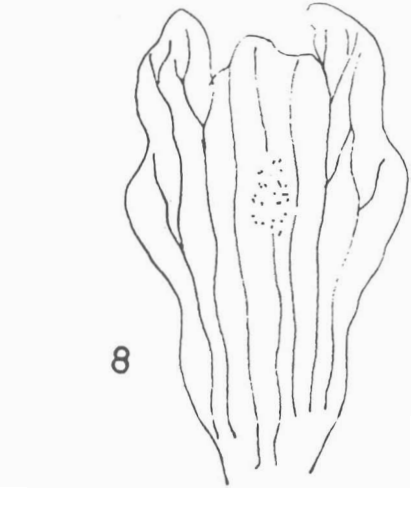
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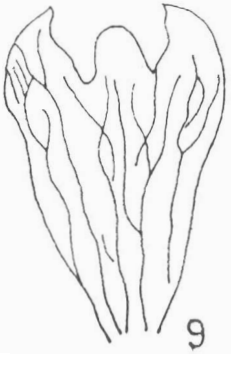
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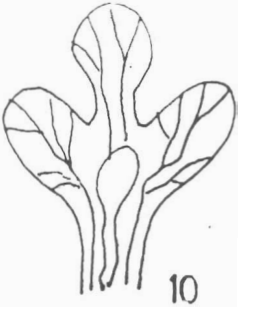
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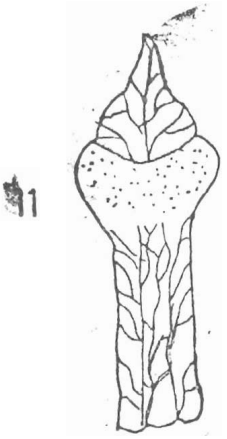
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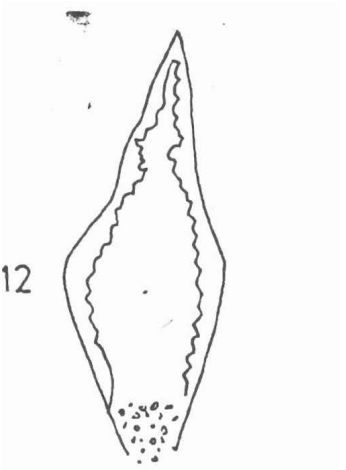
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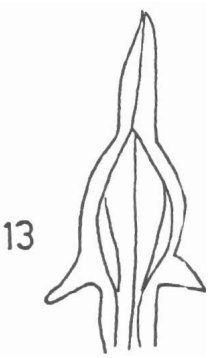
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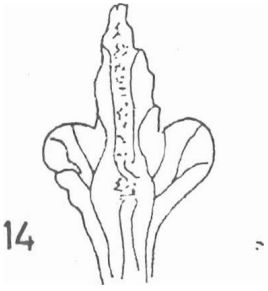
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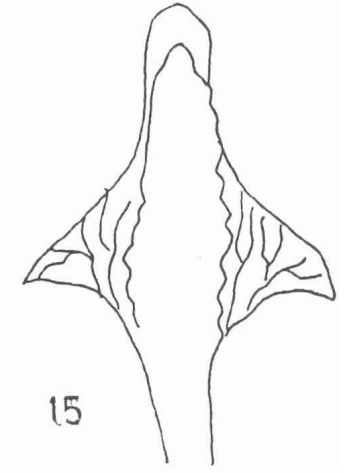
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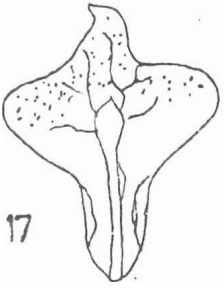
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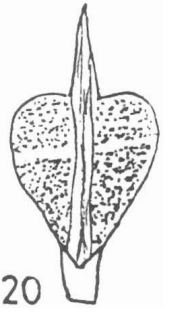
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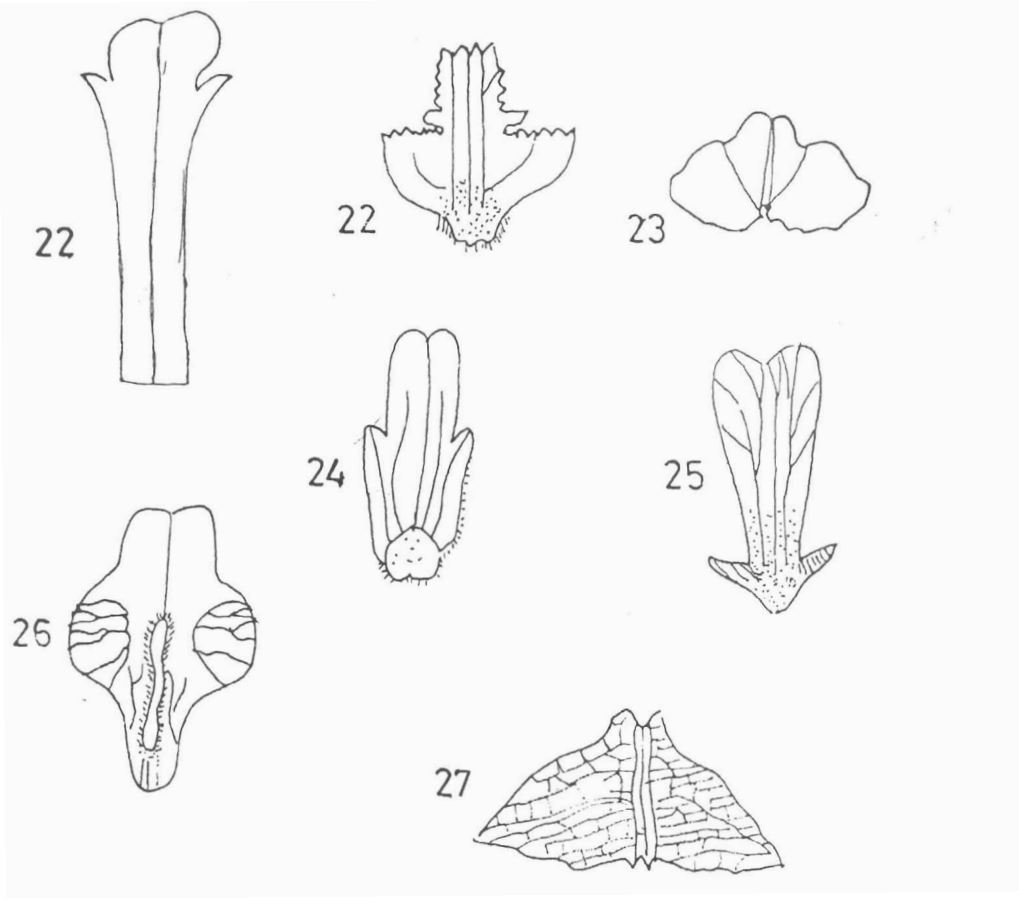
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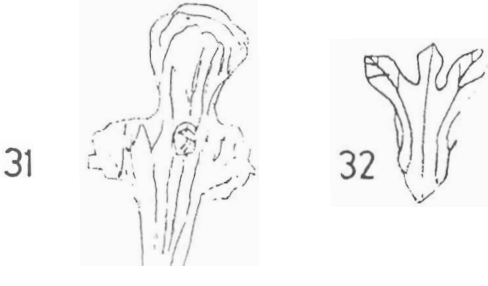
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