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KEY TO THE MALESIAN GENERA OF SAPINDACEAE

(based on vegetative and fruit characteristics)

P.C. VAN WELZEN

Rijksherbarium, Leiden, The Netherlands

SUMMARY

A key to the 40 Malesian genera of Sapindaceae is provided. This key is only meant for fruiting specimens. As a first quick check of the correctness of the identification, short indications of the geography of the genera and, when present, figures of the fruits are provided.

INTRODUCTION

Identifying Sapindaceae has always been a rather hazardous job. Specimens of different genera sometimes look very similar, and consequently there are numerous misidentifications. The main cause of this trouble is the absence of a reliable key. The present key may overcome at least part of these problems, as the key is only meant for fruiting specimens. Besides some vegetative characters the key only uses fruit characters. Floral characters have been omitted as Sapindaceae usually only have either flowers or fruits (sterile ones are better thrown away; they are almost impossible to identify). Accordingly, a separate key for flowering material has to be constructed.

The present key can be used without any problem for mature fruits. Immature fruits will remain difficult to identify, but in order to enable the latter as much as possible, several characters, which are only well visible in mature fruits (e.g. shape of fruit, sarcotesta/arilloid characters), have not been fully employed. The unfortunate result of this approach is that several genera key out more than once. The latter is also a result of the presence of many genera with polythetic sets of characters, e.g. *Nephelium* always has spined or ribbed fruits, except for *Nephlium maingayi; Arytera macrobotrys* has very different fruits compared to the other *Arytera* species.

The genus *Gongrospermum* (from the Philippines) has been omitted from this key, because material and knowledge of this genus is very insufficient.

Several genera have only recently been recorded for Malesia, e.g. *Diploglottis, Sarcotoechia* and *Synima.* They are added to this key.

Arytera and *Cupaniopsis* will very probably be split into several distinct genera after their revision. The possible consequenses of these actions for this key only are

some changes of names in several leads, e.g. lead 39b: *Cupaniopsis platycarpa,* lead 52b: *Arytera macrobotrys.*

When a genus is keyed out the rough indication of its geography may serve as a first check. The figures, at least one of each genus if a plate was available, serve as another check.

When the key directly leads to a species or subgenus, the name of the species or subgenus is provided. This prevents unnecessary work and enables the identification of several species for which no modern keys exist.

TERMINOLOGY

A good interpretation of fruiting characters is essential. Therefore it is advisable to boil dried fruits and to use a dissecting microscope, otherwise mistakes will happen.

The following terms are very crucial:

Pseudostipules (fig. 12) occur in several genera of Sapindaceae, they are the transformed lower pair of leaflets. Of Malesian Sapindaceae only *Cardiospermum* bears true stipules.

The sepals can be either dimorph (inner three larger than outer two) and rather large or all equal in size and small.

Fruit lobed/not lobed: In a lobed fruit in transversal section the free part of the lobes is longer than the breadth of the axis and dissepiments together (figs. 13, 14, 18; N.B.: some lobes can be abortive); in not or slightly lobed fruits the axis and dissepiments are broader than the free part of the lobes (figs. 3, 15, 54).

The stipe of the fruit is the narrowed basal part, as shown in figs. 1 and 33. Figs. 14, 19, and 32 show fruits without a stipe.

Sarcotesta/arilloid: An arilloid is free from the seed (except around the hilum). A sarcotesta remains stuck to the seed, but the margin or upper part can be free. When a sarcotesta is removed, part of the upper layer of the testa remains attached to it. If only a small ring around the hilum is present, it is advised to regard this as a sarcotesta.

Hilar spot: The place where the hilum is attached plus the surrounding tissue of the seedcoat if this is differently coloured then the rest of the coat. Usually this spot is whitish and can be very large (covering up to half of the seed).

The term pseudofunicle needs some explanation. This is an appendix of the arilloid. In *Sarcopteryx* this pseudofunicle is attached near the hilum, is short and leads straight from the hilum to the base of the fruit. In *Guioa* (fig. 35) and *Mischocarpus* (fig. 41) an appendix of the arilloid is formed on the side of the fruit opposite to where the funicle is attached; this pseudofunicle is usually long and curled and is also attached to the basal corner of the fruit; when the fruit opens, the seeds tumble out and remain dangling on this pseudofunicle.

MALESIAN GENERA

The following list contains the genera which have been treated in this key. An asterisk in front of the generic name indicates that the genus has been revised for Flora Malesia ser. I; the manuscript is present at L. Recent revisions are cited, if no recent revision is recorded use Radlkofer in Engler, Pflanzenreich 98, 1931–34. Of monotypic genera and genera of which only one species occurs in Malesia the name of the species is provided.

* *Alectryon* (Leenhouts, Blumea 33, 1988: in press).
* *Allophylus cobbe* (L.) Raeusch (Leenhouts, Blumea 15, 1967: 301–358).
* *Amesiodendron chinense* (Merrill) Hu
Arytera (van der Ham, Blumea 23, 1977: 289–300; notes only).
* *Atalaya*
* *Cardiospermum*
* *Cubilia cubili* (Blanco) Adelb. (Leenhouts, Blumea 24, 1978: 397, 398).
Cupaniopsis (presently in revision by Adema at L).
Dictyoneura (Van Dijk, Blumea 31, 1986: 437–449).
* *Dimocarpus* (Leenhouts, Blumea 19, 1971: 113–131).
* *Diploglottis* (Leenhouts, Blumea 33, 1988: 197).
* *Dodonaea* (Leenhouts, Blumea 28, 1983: 271–289).
Elattostachys (presently in revision by Leenhouts at L).
* *Euphorianthus euneurus* (Miq.) Leenh. (Leenhouts, Blumea 33, 1988: 198).
* *Ganophyllum falcatum* Blume
* *Glenniea* (Leenhouts, Blumea 21, 1973: 91–103; Blumea 22, 1975: 411–414).
Gloeocarpus
Guioa (presently in revision by Van Welzen at L).
* *Harpullia* (Leenhouts & Vente, Blumea 28, 1982: 1–51).
* *Jagera*
Koelreuteria
Lepiderema
Lepidopetalum
* *Lepisanthes* (Leenhouts, Blumea 17, 1969: 33–91; Blumea 18, 1970: 429, 430).
* *Litchi chinensis* Sonn. (Leenhouts, Blumea 31, 1986: 398–402).
Mischocarpus (Van der Ham, Blumea 23, 1977: 251–288).
* *Nephelium* (Leenhouts, Blumea 31, 1986: 373–436).
* *Paranephelium* (Davids, Blumea 29, 1984: 425–441).
* *Pometia* (Jacobs, Reinwardtia 6, 1962: 109–144).
Rhysotoechia
* *Sapindus*
Sarcopteryx (presently in revision by Leenhouts at L).
* *Sarcotoechia* (Leenhouts, Blumea 33, 1988: 198).
* *Schleichera oleosa* (Lour.) Oken
* *Synima cordierorum* (F.Muell.) Radlk.

* *Toechima erythrocarpum* (F.Muell.) Leenh. subsp. *papuanum* Leenh. (Leenhouts, Blumea 33, 1988: 204).
* *Trigonachras* (Leenhouts, Blumea 33, 1988: 204).
* *Tristira triptera* (Blanco) Radlk.
* *Tristiropsis*
* *Xerospermum* (Leenhouts, Blumea 28, 1983: 389–401).

ACKNOWLEDGEMENTS

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Mrs. Reynolds went through a lot of pain, she even made her own key. Dr. Leenhouts spent many successful hours of painstakingly controlling the key.

The drawings were taken from several publications and manuscripts. Most were made by several artists from L and BRI (with courtesy of Mrs. Reynolds).

SHORT KEY

The key has several groups of genera. The groups are defined by a few characters. The following short key provides a quick entry to the complete key. If used one is not obliged to go through the complete key. N.B.: stick to the sequence of this short key, not all Sapindaceae with pseudostipules are *Pometia*, other genera also possess them.

1. Leaves:
   - biternate ..... **Cardiospermum**
   - bipinnate ..... couplet 3
   - simple, imparipinnate, digitate ..... couplet 5
   - paripinnate 2

2. Fruits:
   - with wing, crest or sharp margin ..... couplet 9
   - warty to spiny ..... couplet 16
   - with stinging hairs ..... **Jagera**
   - ovate, inflated, papery ..... **Koelreuteria**
   - not winged, smooth, glabrous to pilose, no stinging hairs, fruit not inflated (if seemingly inflated, then fruit obcordate) 3

3. Seeds:
   - naked; placenta not thickened ..... couplet 25
   - with arilloid and/or sarcotesta, if naked then placenta thickened 4

4. Indumentum:
   - stellate or bundle hairs besides simple ones ..... couplet 32
   - only simple hairs or glabrous 5

5. Pseudostipules:
   - present ..... **Pometia**
   - absent 6

6. Wall of fruit inside:
   - pilose, sometimes margin of valves only . . . . . couplet 35
   - glabrous . . . . . couplet 46

KEY

1a. Tree, shrub, or occasionally a woody climber. Leaves simple, 1- foliolate, digitate or (bi)pinnate. Inflorescence without tendrils 2
 b. Herbaceous climber. Leaves biternate. Inflorescence with a pair of tendrils. Malesia; fig. 17 . . . . . **Cardiospermum**

2a. Leaves bipinnate (observe absence of axillary buds on secundary rhachises) . 3
 b. Leaves simple, 1-foliolate, digitate or pinnate 4

3a. Fruits about globose, coriaceous (fig. 61). W. border: Philippines to Borneo to Lesser Sunda Is.; E. border: New Guinea; fig. 61 . . . . . **Tristiropsis**
 b. Fruits lobed, papery (like fig. 17). Cultivated . . . . . **Koelreuteria**

4a. Leaves all simple, digitate, or imparipinnate 5
 b. Leaves paripinnate or pseudo-imparipinnate (occasionally some 1-foliolate). 8

5a. Fruit not winged. Leaves digitate or imparipinnate 6
 b. Fruit winged. Leaves simple. Malesia; fig. 8. . . . . **Dodonaea**

6a. Leaves 1-foliolate or imparipinnate. Fruit either (slightly) lobed and coriaceous, or about globose and very woody; larger than 1 by 1.5 cm; if about 1 by 1.5 cm then rhachis winged 7
 b. Leaves (1–)3(–5)-digitate; rhachis not winged. Fruits globose to obovoid, coriaceous, at most 0.4–1.3 by 0.3–0.8 cm. Malesia; fig. 5 **Allophylus cobbe**

7a. Pseudostipules (fig. 12) present or not; rhachis winged or not. Fruit (slightly) lobed, smooth, coriaceous; wall inside glabrous. Malesia; figs. 12–16 **Lepisanthes** subgenus **Otophora**
 b. Pseudostipules absent; rhachis not winged. Fruits about globose, spiny to warty, woody; wall inside pilose. Malaya to Philippines (Mindanao) and Borneo; figs. 47–50 . . . . . **Paranephelium**

8a. Fruits winged (figs. 8, 52), or with a crest on top of locules (fig. 1), or with a narrow sharp margin (fig. 55) along the locules 9
 b. Fruits without wings, crest, or sharp margins, margins blunt 15

9a. Fruits winged (figs. 8, 55) or with a sharp margin along the locules. Seeds naked, or with an arilloid, or with a smooth sarcotesta 10

b. Fruits with crest on top of locules (fig. 1). Seeds with a longitudinal strip of usually highly papillate sarcotesta (fig. 2). W. border: Philippines to Borneo to Java; E. border: New Guinea; fig. 1, 2. . . . **Alectryon** subgenus **Alectryon**

10a. Wings of fruit higher than broad (fig. 8) 11
b. Wings of fruit broader than high (fig. 26). Lesser Sunda Is. and New Guinea; fig. 26 . . . . . **Atalaya**

11a. Wings less than 2 mm broad. Seed (partly) covered by either an arilloid or a sarcotesta. Moluccas, New Guinea 12
b. Wings 4–10 mm broad. Seed naked. E. Philippines, Celebes, Moluccas; figs. 52, 53 . . . . . **Tristira triptera**

12a. Fruit wall inside glabrous. Seed mainly to completely covered by an aril loid 13
b. Fruit wall inside pilose. Seed partly covered by a sarcotesta 14

13a. Leaflets crenate. Sepals dimorph. Pseudofunicle long. New Guinea **Guioa pteropoda**
b. Leaflets entire. Sepals equal. Pseudofunicle very short. Moluccas, New Guinea; figs. 55, 56. . . . . **Sarcopteryx**

14a. Leaflets without domatia. Fruit 3-locular, outside very sparsely puberulous **Synima cordierorum**
b. Leaflets (usually) with hair tufts as domatia. Fruit 2-locular, outside glabrous **Lepidopetalum**

15a. Fruits warty to densely spiny or densely scaled (figs. 18–20, 44, 48). N.B.: subbasally the remnant of the stigma of *Nephelium maingayi* (fig. 21) may look like a spine 16
b. Fruits smooth to wrinkled when dry (fig. 5) 22

16a. Fruit wall inside glabrous. Seed with sarcotesta or arilloid 17
b. Fruit wall inside hairy. Seed naked. Malaya, Sumatra, Philippines (Mindanao) and Borneo; figs. 47–50. . . . . **Paranephelium**

17a. Fruit completely set with scales to simple spines 18
b. Fruit with very few simple or branched spines (fig. 44). Sumatra (cult.), Java, Lesser Sunda Is., Celebes, Moluccas; figs. 44, 45 . . . . **Schleichera oleosa**

18a. Seed with sarcotesta 19
b. Seed with arilloid 20

19a. Leaflets 1–5(–18)-jugate, papillate below (dull), often minutely sericeous; without glandular scales. Sepals free to more than halfway up connate. Spines and scales on fruit usually higher than broad. Malaya to Moluccas; figs. 18–21 **Nephelium**

b. Leaflets 1–2(–3)-jugate, smooth below (more or less shiny), glabrous or at most hairy on midrib and nerves, not sericeous; often with scattered glandular scales. Sepals free or only basally connate. Spines on fruit lower than broad. Malaya, Sumatra, Java, Borneo; figs. 58–60. . . . . **Xerospermum**

20a. Arilloid covering seed completely. Fruit indehiscent. Indumentum of tufted, 2-branched or simple hairs 21
b. Arilloid covering lower half of seed only (fig. 7). Fruit dehiscent. Indumentum of simple hairs only. Java (cult.), E. Borneo, E. Philippines, Celebes, Moluccas; figs. 6, 7. . . . . **Cubilia cubili**

21a. Indumentum often partly or mainly consisting of dense tufts of hairs. Glands present on lower side of leaflets near axils of veins (seldomly absent in all leaflets). Seed about as high as broad. Malesia; figs. 24, 25 . . . **Dimocarpus**
b. Indumentum consisting of solitary, simple or 2-branched hairs. Glands absent. Seed higher than broad. Malesia (often only cult.); fig. 27 . **Litchi chinensis**

22a. Fruit glabrous or velutinous with short (up to 1 mm) non- stinging hairs . 23
b. Fruit covered with long (more than 1 mm) stinging hairs (remaining stuck to fingers). Moluccas, New Guinea; fig. 30. . . . . **Jagera**

23a. Fruit not inflated (seed with, if present, arilloid and/or sarcotesta, seed tightly fitting in fruit); wall fleshy to coriaceous to woody. (If fruit seemingly inflated than fruit obcordate.). 24
b. Fruit inflated, ovate; wall papery (like fig. 17). Cultivated. . . . **Koelreuteria**

24a. Seed naked. Placenta not thickened and cup-shaped below seed 25
b. Seed with sarcotesta (can be narrow basal ring around hilum) and/or arilloid, or with thickened, cup-shaped placenta below seed. 31

25a. Leaves and twigs without glandular scales, at most hairs only 26
b. Leaves and twigs, besides with hairs, covered with glandular scales (microscope!). Malesia; fig. 32 . . . . . **Ganophyllum falcatum**

26a. Wall of fruit inside hairy, sometimes only around placenta. 27
b. Wall of fruit inside glabrous 30

27a. Wall of fruit inside completely hairy. 28
b. Wall of fruit inside only hairy around placenta. Malesia; fig. 51. . . **Sapindus**

28a. Fruit sessile, about ellipsoid (to shortly obovoid) to subglobular, not dehiscing to dehiscing into 3 or 4 usually unequal valves or tearing apart at random; 2- or 3-locular. Either wall thick and hilar spot covering up to lower 3/4 of seed or wall thin and hilar spot covering less than lower 1/3 of seed. 29

b. Fruit on broad stipe, obovoid, dehiscing loculicidally into 3 equal valves; 3-locular; wall thick, fleshy. Hilar spot covering less than lower 1/3 of seed. Malesia. . . . . **Trigonachras**

29a. Indumentum of short hairs at most. Leaflets entire to serrate. Fruit capsular; wall 2.5–12 mm thick. Hilar spot covering up to lower 3/4 of seed. Malaya to Philippines (Mindanao) and Borneo; figs. 47–50. . . . . **Paranephelium**
b. Indumentum often consisting of more than 5 mm long hairs. Leaflets entire. Fruit drupaceous; wall less than 2 mm thick. Hilar spot covering less than lower 1/5 of seed. Malesia . . . . . **Lepisanthes tetraphylla**

30a. Pseudostipules (fig. 12) present or not; rhachis winged or not; jugae 1 to more than 40. Outer (1 or) 2 sepals smaller. Fruit 2-, 3- (or 4)-locular, glabrous or pilose, less than 5 cm high; wall usually thin, sometimes thick, fleshy. Malesia; figs. 12–16 . . . . . **Lepisanthes**
b. Pseudostipules absent; rhachis not winged; jugae 1–6. Sepals all equal. Fruits 2-locular, glabrous, either less than 2 cm high and wall rather thin or more than 6 cm high and wall very thick and fleshy. Malaya, Sumatra, Philippines, Borneo, New Guinea . . . . . **Glenniea**

31a. Indumentum of stellate hair tufts besides solitary hairs 32
b. Indumentum of solitary hairs or plant glabrous 33

32a. Fruit lobed, loculicidally dehiscent into valves. Hilar region small, covering less than 1/6 of seed. Malesia; figs. 37–39 . . . . . **Harpullia**
b. Fruit not lobed, breaking up irregularly. Hilar region very large, covering up to 1/2 of seed. Malesia; figs. 24, 25. . . . . **Dimocarpus**

33a. Pseudostipules (fig.12) absent.Fruit lobed or not; carpels usually thin,to thick, coriaceous to woody, rarely mesocarp fleshy when fresh (*Toechima*) . . . 34
b. Pseudostipules present, also in inflorescence (sometimes reduced or early caducous: look for scar). Fruit lobed, but simple by abortion; exocarp thin, hard, mesocarp thick, juicy when fresh. Malesia; fig. 43 . . . . . **Pometia**

34a. Fruit wall inside completely hairy or only along suture 35
b. Fruit wall inside glabrous. 46

35a. Fruit wall inside (nearly) completely hairy (sometimes only along suture, but then stigma lobed (figs. 29, 40) and fruit not to hardly lobed, obovate) . . 36
b. Fruit wall inside only hairy along suture; fruit lobed, obcordate; pistil not lobed. Malesia; figs. 22, 23. . . . . **Arytera**

36a. Fruit inside without an extra fleshy layer. 37
b. Fruit inside with an extra fleshy layer (fig. 10), thickest in middle of the valves, decreasing in thickness towards margin of valves and towards dissepiments. E. Borneo to New Guinea; figs. 9–11. . . . **Dictyoneura acuminata**

37a. Fruit dehiscing loculicidally. Seed either (partly) covered by a smooth sarcotesta or by an arilloid 38
b. Fruit either dehiscing with an irregular calyptra (fig. 2), then seed covered with a longitudinal strip of usually highly papillate sarcotesta (subgenus *Alectryon*; figs. 1, 2) or fruit dehiscing septifragally along dissepiments (fig. 4), then seed partly covered by a basal arilloid, attached to a sarcotestal annulus (subgenus *Synalectryon*). W. border: Philipines, Celebes, E. Java; E. border: New Guinea; figs. 1–4 . . . . . **Alectryon**

38a. Seeds (partly) covered by a sarcotesta (N.B.: upper margin can be free from seed), arilloid absent 39
b. Seeds (partly) covered by an arilloid, sarcotesta restricted to the attachment around the hilum 42

39a. Fruit (2- or) 3-locular, if 2 locular fruit less than 1 cm high 40
b. Fruit 2-locular, more than 3 cm high. New Guinea
Cupaniopsis platycarpa

40a. Fruit more than 1 cm high, 3-locular, not stiped. Disc glabrous. 41
b. Fruit less than 1 cm high, 2- or 3-locular, shortly stiped. Disc hairy. New Guinea . . . . . **Sarcotoechia**

41a. Leaflets with usually less than 10 major, spaced, strongly curved nerves. Fruit glabrous or tomentose; wall more than 2 mm thick. New Guinea; fig. 46
Toechima erythrocarpum subsp. **papuanum**
b. Leaves with more than 14 major, dense, rather straight nerves. Fruit tomentellous; wall slightly thickened, usually c. 1 mm thick. Philippines, Celebes, Moluccas, New Guinea; fig. 36 . . . . . **Euphorianthus euneurus**

42a. Fruit usually not stiped. Stigma erect, not lobed, only grooved (fig. 33). Arilloid without basal extension. 43
b. Fruit usually on a narrow stipe. Stigma lobed, lobes spreading (fig. 40). Arilloid usually with pseudofunicle (fig. 41). Malesia; figs. 40–42
Mischocarpus

43a. Fruit wall thin coriaceous to coriaceous, glabrous to pilose. 44
b. Fruit wall woody, glabrous. W. border: Philippines to Java; E. border: New Guinea; fig. 31. . . . . **Elattostachys**

44a. Fruit 3-locular, glabrous to hairy, not to slightly lobed 45
b. Fruit 2- (or 3-)locular, glabrous, lobed, lobes spreading. Malesia; figs. 22, 23
Arytera brachyphylla

45a. Sepals inequal. Disc complete to interrupted. Fruit wall coriaceous. Seed ellipsoid to obovoid; (lobed) arilloid partly to completely covering seed. Celebes, Moluccas, New Guinea; fig. 28 . . . . . **Cupaniopsis**

b. Sepals equal. Disc interrupted. Fruit wall thin coriaceous. Seed lenticular; bilobed arilloid covering seed. New Guinea; fig. 57 ..... **Diploglottis**

46a. Placenta seldomly thickened below seed. Seed (partly) covered by sarcotesta and/or arilloid 47
b. Placenta thickened below seed, about cup-shaped. Seed naked. Philippines, Borneo to New Guinea ..... **Rhysotoechia**

47a. Fruit inside without an extra fleshy layer 48
b. Fruit inside with an extra fleshy layer (fig. 10), thickest in middle of the valves, decreasing in thickness towards margin of valves and towards dissepiments. New Guinea; figs. 9–11 ..... **Dictyoneura obtusa**

48a. Seeds covered with either an arilloid or a glabrous sarcotesta. Fruits indehiscent or irregularly or loculicidally dehiscing 49
b. Seeds either covered with a longitudinal strip of usually highly papillate sarcotesta, locules of fruit opening with an irregular calyptra (fig. 2; subgenus *Alectryon*); or seed partly covered with a smooth sarcotesta attached to a separate arilloid, locules dehiscing septifragally from dissepiments (fig. 4; subgenus *Synalectryon*). W. border: Philippines, Celebes, E. Java; E. border: New Guinea; figs. 1–4 ..... **Alectryon**

49a. Seed (partly) covered with a sarcotesta 50
b. Seed (partly) covered with an arilloid 51

50a. Leaflets crenate to dentate. Fruits 3-locular (watch for abortive locules), wall c. 2 mm thick. Sarcotesta only present around hilum. Malaya, Sumatra **Amesiodendron chinense**
b. Leaflets entire. Fruits 1-locular, wall thin, less than 2 mm thick. Sarcotesta completely covering seed. Malaya, Sumatra, Borneo; fig. 21 **Nephelium maingayi**

51a. Fruit indehiscent or dehiscing irregularly 52
b. Fruit loculicidally dehiscent 53

52a. Fruit a 1- or 2-celled dry berry, indehiscent, not to hardly stiped, ellipsoid; endocarp in dried state not detached from mesocarp. Sumatra (cult.), Java, Lesser Sunda Is., Celebes, Moluccas; figs. 44, 45 .... **Schleichera oleosa**
b. Fruit a 3-locular (usually only 1 developed) capsule, dehiscing irregularly, long-stiped, globose; endocarp in dried state detached from mesocarp, forming cupule around arilloid. New Guinea ..... **Arytera macrobotrys**

53a. Fruit not to hardly lobed, globular to obovoid. Pseudofunicle sometimes present, then stigma with spreading lobes 54
b. Fruit lobed, obcordate. Pseudofunicle seldomly absent. Stigma not lobed, only grooved. Malesia; figs. 34, 35 ..... **Guioa**

54a. Fruit stiped or not. Arilloid without pseudofunicle. Stigma lobes straight (fig. 39). 55
b. Fruit usually on a long slender stipe. Arilloid usually with a pseudofunicle (fig. 41). Stigma lobes recurved (fig. 40). Malesia; figs. 40–42. . **Mischocarpus**

55a. Branchlets more or less straight. Leaves 2–10-jugate. Leaflets entire to serrate to crenate; glandular scales absent or present. Inflorescence ramiflorous to axillary to terminal. Fruits sessile to stiped. Moluccas, New Guinea. . . . 56
b. Branchlets usually sinuate in appearance because of phyllotaxis. Leaves 8–14-jugate. Leaflets serrate to crenate; glandular scales absent. Inflorescence ramiflorous. Fruits stiped. Philippines. . . . . **Gloeocarpus**

56a. Axis pith thin. Leaflets margin entire; apex not mucronate; glandular scales often present. Disc glabrous. Fruit glabrous, wall thin, stipe very slender. Fig. 33. . . . . **Lepiderema**
b. Axis pith thin to thick (up to 2/3 of diameter of twig). Leaflets margin entire to serrate to crenate; apex usually mucronate; glandular scales absent. Disc glabrous, or with 5 bundles of hairs, or pilose. Fruit glabrous to pilose, wall thin to thick, stipe absent to broadly cuneate. Fig. 28 . . . . . **Cupaniopsis**

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Fig. 10: *Dictyoneura acuminata* Bl.umesubsp. *acuminata*, valve from inside showing the densely hairy extra fleshy layer (*Kostermans 6892*).

Fig. 11: *Dictyoneura acuminata* Blume subsp. *acuminata*, seed, ventral side with partly covering arilloid (*Kostermans 6892*).

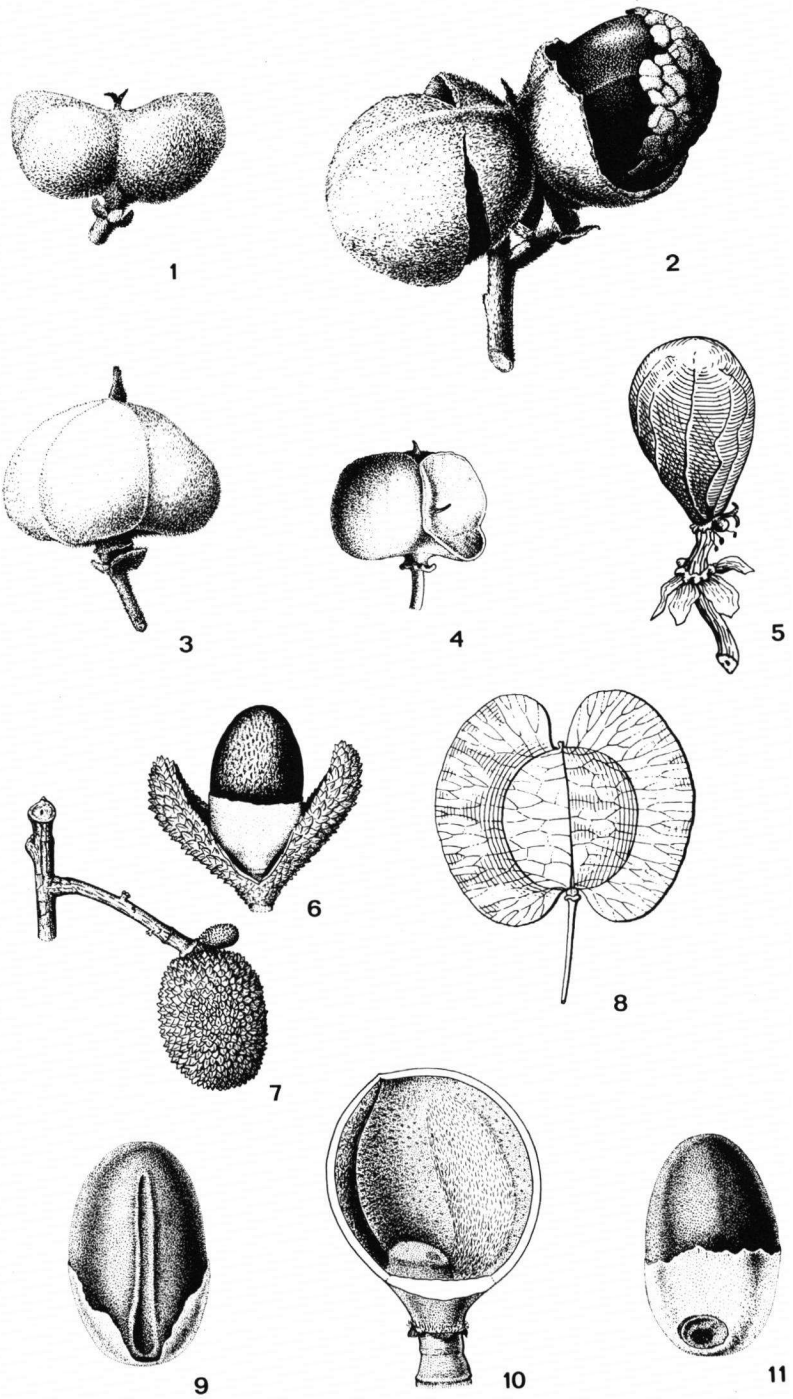
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Fig. 12: *Lepisanthes kinabaluensis* Leenh., pseudostipules (*RSNB 4998*).

Fig. 13: *Lepisanthes kinabaluensis* Leenh., lobed fruit (*RSNB 4998*).

Fig. 14: *Lepisanthes divaricata* Leenh. f. *divaricata*, fruit (*Rehal 13015*).

Fig. 15: *Lepisanthes fruticosa* (Roxb.) Leenh., fruit (after P. van Royen).

Fig. 16: *Lepisanthes senegalensis* (Poir.) Leenh., lobed fruit (*Kostermans 1538*).

Fig. 17: *Cardiospermum halicacabum* L., inflorescence with tendrils, fruits inflated, papery (from Radlk. in Engler, Pflanzenr. 98 (1933) 380, pl. 8).

Fig. 18: *Nephelium daedaleum* Radlk., fruit (*SAN 50490*).

Fig. 19: *Nephelium compressum* Radlk., fruit (*Beccari PB 1268*).

Fig. 20: *Nephelium meduseum* Leenh., fruit (*S 32399*).

Fig. 21: *Nephelium maingayi* Hiern, 1-locular fruit with subbasal style (*SAN 38799*).

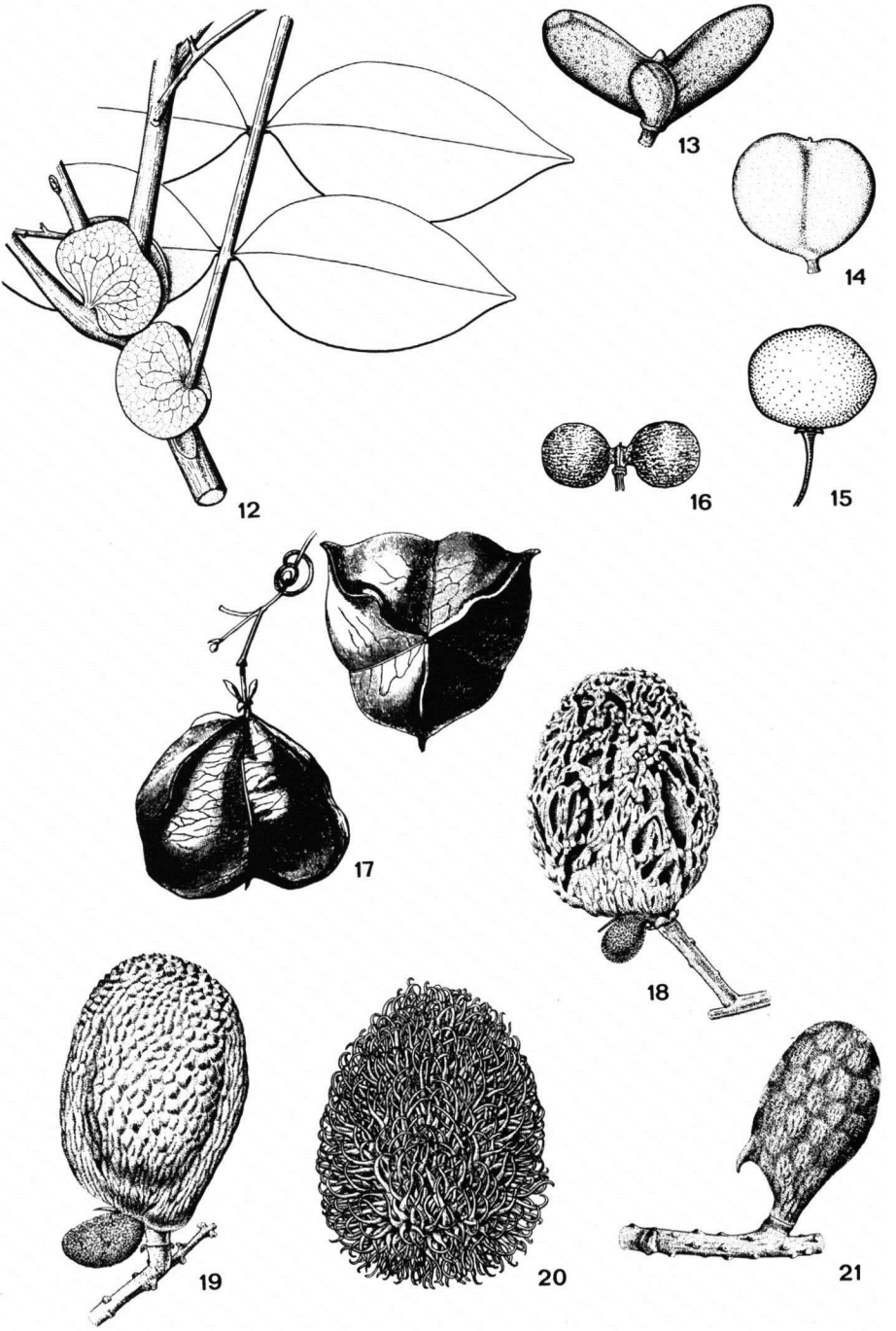
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Fig. 22: *Arytera distylis* (F. Muell.) Radlk., lobed fruit (*Jessup 164 & Reynolds* from Reynolds, Austrobaileya 2 (1985) 162).

Fig. 23: *Arytera*, section through arilloid (a: arilloid, b: fold of arilloid, c: micropylar slit in arilloid, d: testa, e: internal fold of testa, f: micropyle, g: radicle, h: cotyledons, i: funicle, j: bundle).

Fig. 24: *Dimocarpus dentatus* Leenh., fruit (*Kostermans 12654*).

Fig. 25: *Dimocarpus dentatus* Leenh., young seed with only partly developed arilloid (*Kostermans 1264*).

Fig. 26: *Atalaya calcicola* Reynolds, *Acer*-like winged fruit (from Reynolds, Austrobaileya 1 (1981) 403).

Fig. 27: *Litchi chinensis* Sonn. subsp. *chinensis*, fruit (cultivated material).

Fig. 28: *Cupaniopsis tomentella* (Benth.) Reynolds, fruits (from Reynolds, Austrobaileya 2 (1984) 51).

Fig. 29: *Lepidopetalum perrottetii* (Camb.) Bl., fruit (after P. van Royen).

Fig. 30: *Jagera pseudorhus* (A. Rich.) Radlk., fruit with stinging hairs (from P. van Royen, Man. For. Trees Papua & N.G. 2 (1964) 3).

Fig. 31: *Elattostachys microcarpa* Reynolds, woody fruits (*Webb & Tracey 13275;* from Reynolds, Austrobaileya 2 (1985) 156).

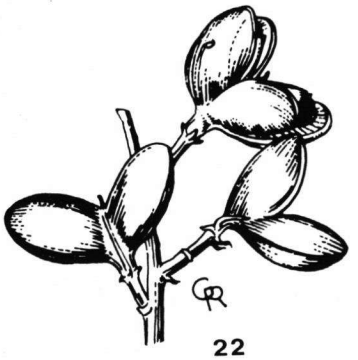
Fig. 32: *Ganophyllum falcatum* Blume, fruit (from P. van Royen, Man. For. Trees Papua & N.G. 2 (1964) 3).

Fig. 33: *Lepiderema melanorrhachis* Merr. & Perry, fruit (from P. van Royen, Man. For. Trees Papua & N.G. 2 (1964) 3).

Fig. 34: *Guioa bijuga* (Hiern) Radlk., lobed fruit (after P. van Royen).

Fig. 35: *Guioa semiglauca* (F. Muell.) Radlk., dehisced fruits with seeds dangling on extension of arilloid (from Reynolds, Austrobaileya 2 (1984) 40).

Fig. 36: *Euphorianthus obtusatus* Radlk., fruit (from P. van Royen, Man. For. Trees Papua & N.G. 2 (1964) 3).



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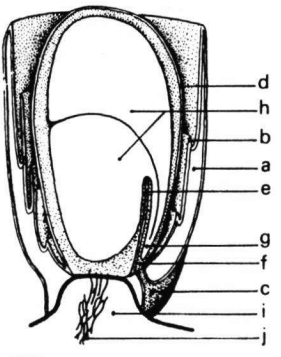

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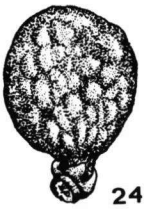

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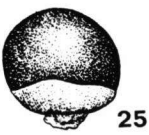

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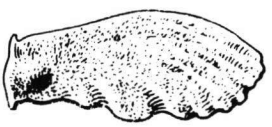

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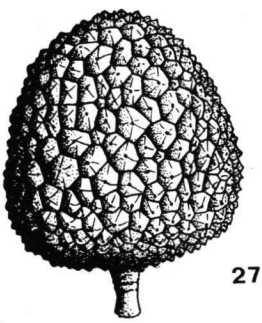

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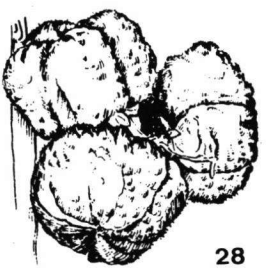

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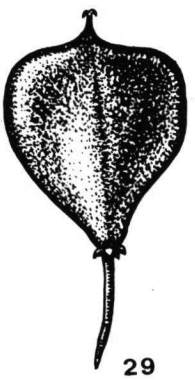

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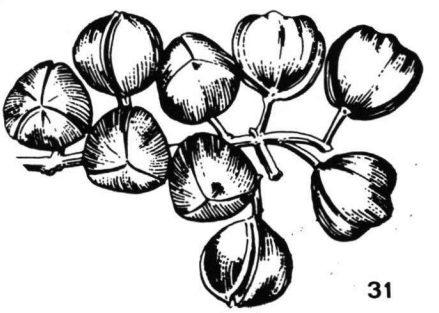

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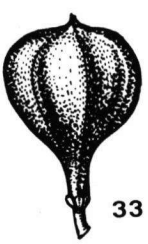

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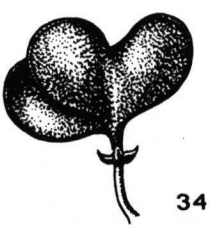

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Fig. 37: *Harpullia ? cauliflora* K. Schum. & Lauterb., lobed fruit (*Hoogland & Craven 10551*).

Fig. 38: *Harpullia leptococca* Radlk., lobed fruit (*NGF 12367*).

Fig. 39: *Harpullia arborea* (Blanco) Radlk., lobed fruit (*NGF 39454*).

Fig. 40: *Mischocarpus grandissimus* (F. Muell.) Radlk., fruit (*MEL 56004*).

Fig. 41: *Mischocarpus*, seed with arilloid (ap: appendix, ar: arilloid, hi: hilum, te: testa).

Fig. 42: *Mischocarpus paradoxus* Radlk., fruit without stipe (*Forbes 309*).

Fig. 43: *Pometia pinnata* Forst., fruits (L 908.272-215).

Fig. 44: *Schleichera oleosa* (Lour.) Oken, fruit without spines (after P. van Royen).

Fig. 45: *Schleichera oleosa* (Lour.) Oken, fruit with spines (*Colfs 290*).

Fig. 46: *Toechima tenax* (Benth.) Radlk., fruits (*Jessup 243 & Reynolds;* from Reynolds, Austrobaileya 2 (1985) 179).

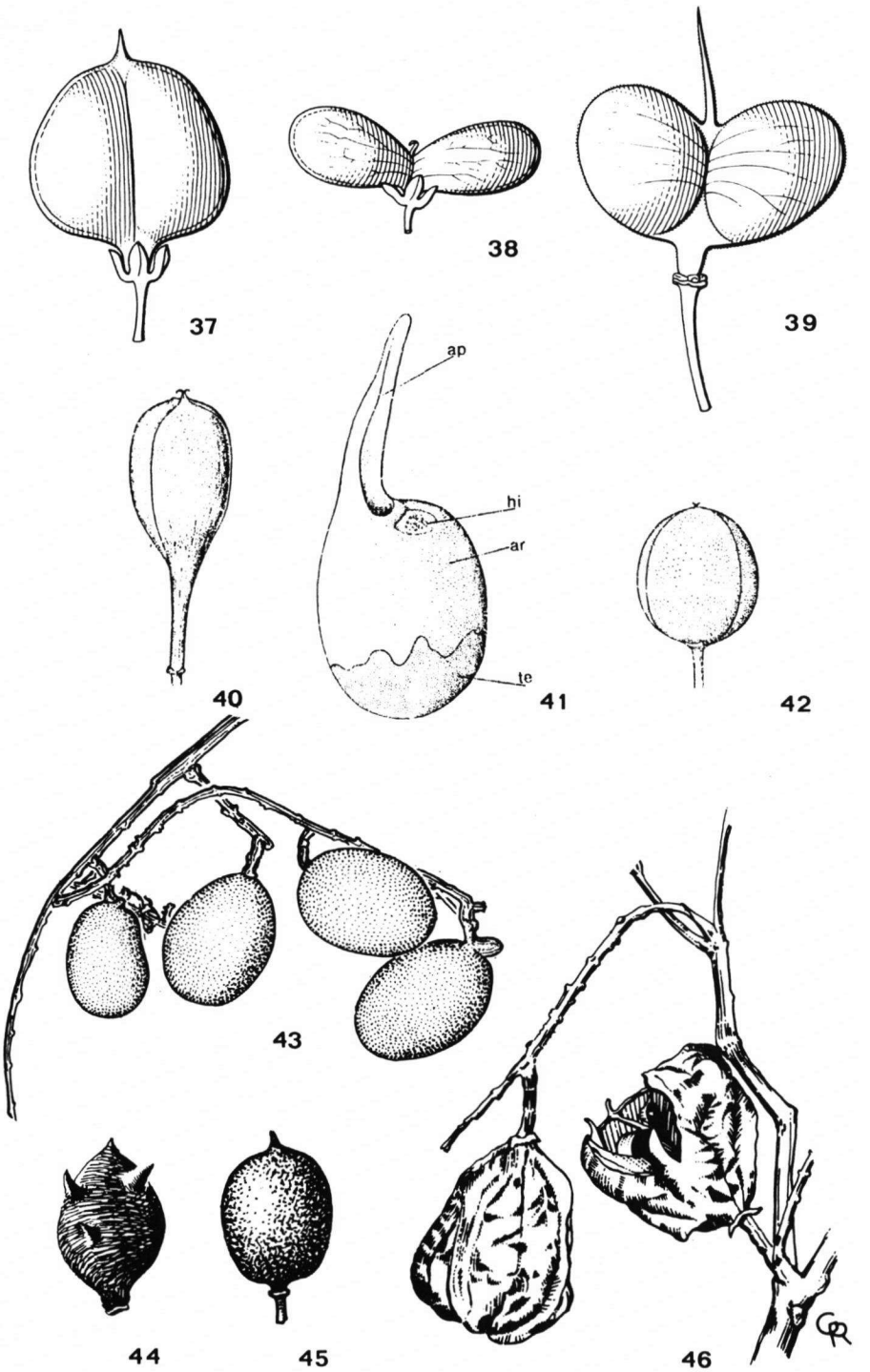
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Fig. 47: *Paranephelium xestophyllum* Miq., fruit (Bogor Bot. Gard. III.J.26).

Fig. 48: *Paranephelium xestophyllum* Miq., fruit (*Kostermans 13238*).

Fig. 49: *Paranephelium xestophyllum* Miq., seed with large white hilum (*Boerlage s.n.*, L 908.270-13).

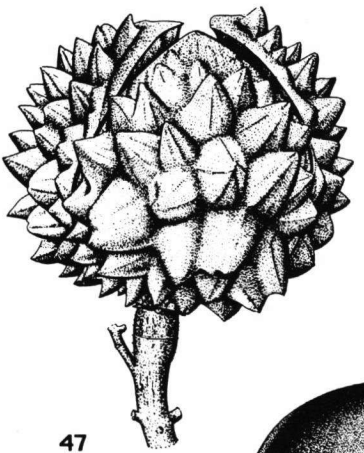
Fig. 50: *Paranephelium xestophyllum* Miq., fruit (*SAN 79936*).

Fig. 51: *Sapindus saponaria* L., fruit with two abortive lobes (*Schodde 2779*).

Fig. 52: *Tristira triptera* Radlk., winged fruits (*Clemens 17902*).

Fig. 53: *Tristira triptera* Radlk., transverse section through winged fruit (*Santos 5153*).

Fig. 54: *Synima cordierorum* (F. Muell.) Radlk., fruit (*Crome 877*).



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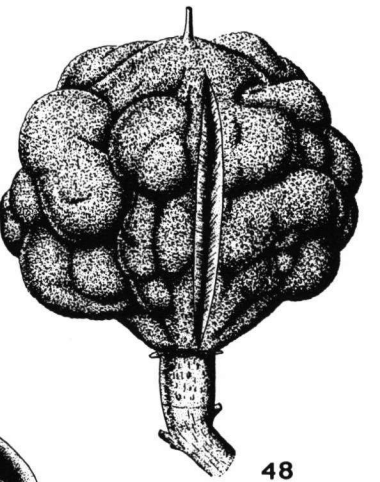

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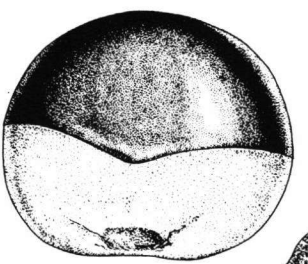

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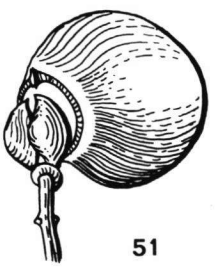

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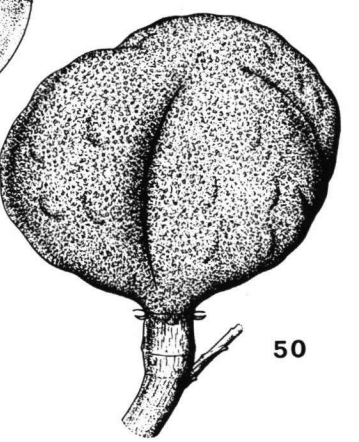

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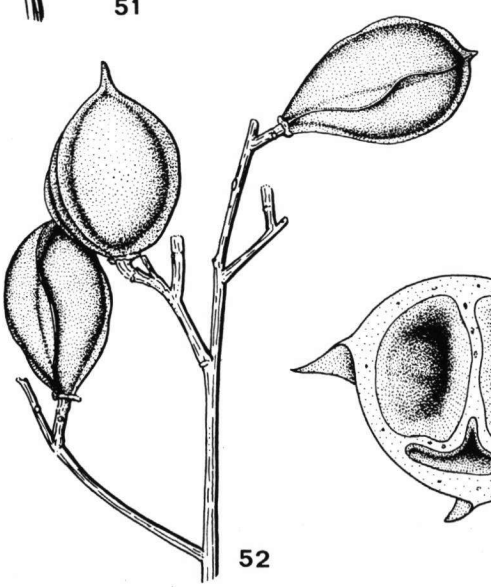

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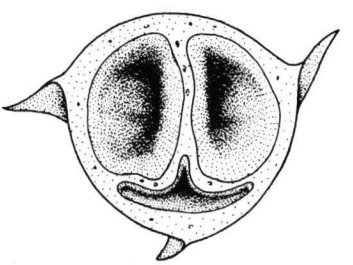

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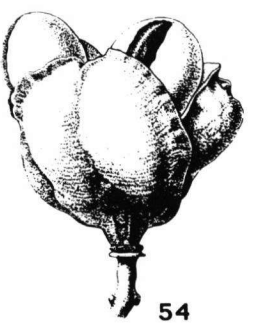

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Fig. 55: *Sarcopteryx montana* Reynolds, sharply edged fruits (from Reynolds, Austrobaileya 2 (1984) 56).

Fig. 56: *Sarcopteryx stipata* (F. Muell.) Radlk., dehisced fruits, seeds partly covered by an arilloid (from Reynolds, Austrobaileya 2 (1984) 56).

Fig. 57: *Diploglottis bracteata* Leenh., fruit (*Webb & Tracey 8219*).

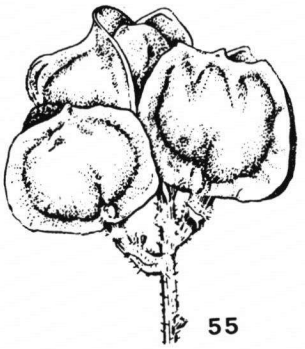
Fig. 58: *Xerospermum noronhianum* Blume, fruit (*KEP FRI 10748*).

Fig. 59: *Xerospermum noronhianum* Blume, fruit (*KEP 29472*).

Fig. 60: *Xerospermum noronhianum* Blume, fruit (*Stone & Sidek 12523*).

Fig. 61: *Tristiropsis ferruginea* Leenh., fruits (*Kostermans 2133*).

Fig. 62: *Sarcotoechia lanceolata* (C. White) Reynolds, fruits (*Williams s.n.* from Reynolds, Austrobaileya 2 (1985) 187).



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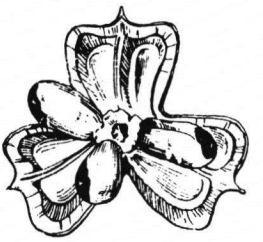

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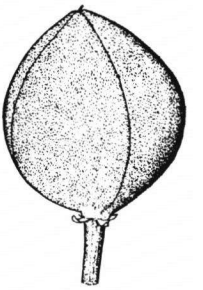

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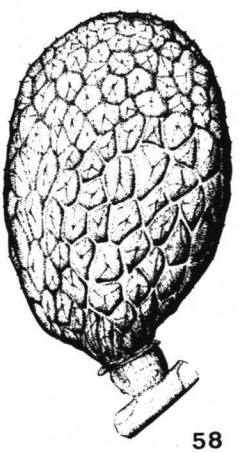

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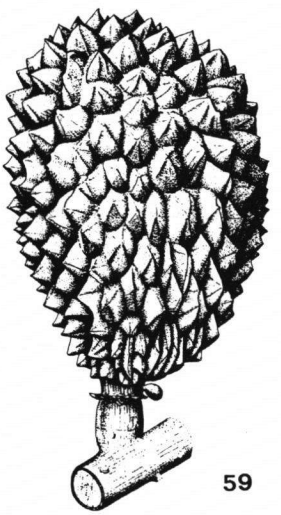

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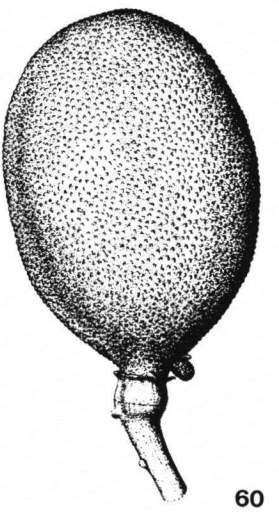

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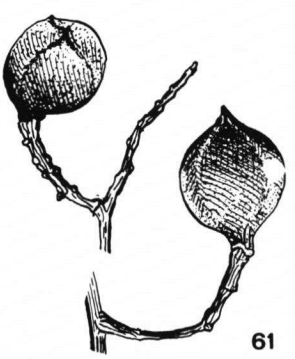

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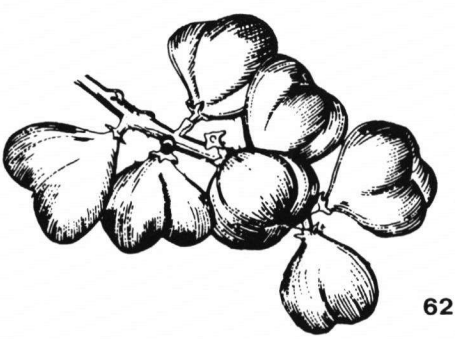

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