

# The Flora of Eastern Himalaya

Vol II



Hiroshi Hara

# THE FLORA OF EASTERN HIMALAYA

## SECOND REPORT

Results of the Botanical Expeditions to Eastern Himalaya in  
1967 and 1969 Organized by the University of Tokyo

Compiled by  
HIROSHI HARA



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2008

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University of Tokyo Press

1971

## PREFACE

This volume comprises the results obtained from the Third Botanical Expedition to Eastern Himalaya (Bhutan, Nepal) in 1967 and the Fourth Expedition (Nepal, Sikkim) in 1969 organized by the University of Tokyo. It also includes supplementary remarks to an earlier volume of "The Flora of Eastern Himalaya" published by the university in 1966 and which was based on the data from the botanical expeditions by the University of Tokyo between 1960 and 1964.

Not only was a large number of botanical specimens and seeds collected, but also many photographs and records on plants in their habitats were prepared. Some of the photographs have already been published in a book titled "Photo-Album of Plants of Eastern Himalaya" in 1968. Some plants brought back from Himalaya have flowered in Japan, and critical comparative studies on corresponding taxa in Japan and Himalaya are in progress.

We are much indebted to the Government of India, the Government of Nepal, the Government of Bhutan, and the Government of Sikkim for providing us with facilities during our trips. Thanks are especially due to His Majesty J. D. Wangchuck, the Maharaja of Bhutan, and His Majesty Thondup Namgyal, the Maharaja of Sikkim, without whose help our expeditions could not have been carried out successfully. We wish to express our hearty thanks to Mr. Martam Topden, Dr. K. Narashinham, and Mr. K. C. Pradhan of the Government of Sikkim, and Dr. P. R. Pandey and Dr. P. N. Suwal of the Department of Medicinal Plants of the Government of Nepal for their kindness in aiding us in our studies.

We acknowledge the extensive assistance of Mr. Naotomo Sasaki of the National Garden Shinjuku Gyoen, Mr. Atuhiko Aoyama of the Department of Botany, University of Tokyo, and Mr. Kunio Sato of Karuizawa who assisted us greatly in cultivating the Himalayan plants for our studies.

The cost of our expedition in 1967 was partly defrayed by a Grant-in-Aid for Fundamental Scientific Research from the Ministry of Education of Japan.

Finally we wish to take this opportunity to express our warm thanks to all the institutions, banks, companies, and persons that have extended support, financial and otherwise, to our botanical expeditions.

January 1971

Hiroshi Hara  
Leader, Botanical Expedition  
to Eastern Himalaya

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## EXPLANATION OF PLATES

- Plate 1. A stream at Nyatoka above Wangdu Phodrang, Bhutan, alt. 1500 m (Apr. 10, 1967). *Desmodium elegans* DC. in full bloom on the left bank.
- Plate 2. a. *Aruncus dioicus* Fernald subsp. *triternatus* Hara at the edge of the forest of *Rhododendron campanulatum*. Sandakphu, the Singalila Range, 3900 m (Jul. 14, 1969).  
 b. *Meconopsis napaulensis* DC. f. *fusco-purpurea* Hara. *Rhododendron lepidotum* Wall. with red-purple flowers on the right side. Mt. Singalila, 3900 m (Jul. 17, 1969).  $\times 1/10$ .  
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- Plate 3. a. *Primula sikkimensis* Hooker. Sandakphu, the Singalila Range, 3850 m (Jul. 15, 1969).  $\times 1/12$ .  
 b. *Begonia flaviflora* Hara. Senchal, Darjeeling, 2350 m (Jul. 6, 1969).  $\times 1/3$ .  
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- Plate 5. a. *Iris Clarkei* Baker. Sandakphu, the Singalila Range, 3900 m (Jul. 15, 1969).  
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- Plate 6. a. *Arisaema erubescens* Schott. Phulchauki, Kathmandu, 2700 m (May 29, 1969).  $\times 1/2$ .  
 b. *Arisaema Griffithii* Schott var. *verrucosum* Hara. Garibas—Tonglu, the Singalila Range, 3000 m (May 2, 1970).  $\times 1/2$ .  
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- Plate 8. a. *Calanthe tricarinata* Lindley, one flower.  $\times 1$ .  
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 c. *Cephalanthera ensifolia* Richard. Gosainkund, C. Nepal, 2700 m (Jun. 4, 1969).  $\times 2/3$ .

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Sandakphu, the Singalila Range, 3900 m (Jul. 15, 1969).  $\times 3/4$ .  
b. *Parnassia Wightiana* Wallich.  
Phalut, the Singalila Range, 3800 m (Jul. 16, 1969).  $\times 2/3$ .  
c. *Chrysosplenium singalilense* Hara in fruit.  
Phalut, the Singalila Range, 3870 m (Jul. 18, 1969).  $\times 3/2$ .  
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Phyang La, Sikkim, 1700 m (Jul. 1, 1969).  
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b. *Rubus splendidissimus* Hara.  
Meghma—Chitrey, the Singalila Range, 2800 m (Jul. 22, 1969).  $\times 1$ .  
c. *Rubus gigantiflorus* Hara.  
Tonglu, the Singalila Range, 3000 m (Jul. 12, 1968).  $\times 3/4$ .  
d. *Rubus fragarioides* Bertoloni.  
Sandakphu, the Singalila Range, 3800 m (Jul. 15, 1969).  $\times 1$ .  
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b. *Cardiocrinum giganteum* Makino.  
Phulchauki, Kathmandu, 2700 m (Jun. 10, 1969).  $\times 1/2$ .  
c. The same.  $\times 1/4$ .  
d. *Ophiopogon parviflorus* Hara.  
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c. *Polygonatum singalilense* Hara.  
Phalut, the Singalila Range, 3900 m (Jul. 18, 1969).  $\times 1/2$ .  
d. *Polygonatum verticillatum* with alternate or opposite leaves.  
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- Plate 13. Pollen grains of the section Dollinera of *Desmodium*.  $\times 1000$ . a–d: *D. amethystinum* (Garrett 53), e–h: *D. multiflorum* (Kingdon-Ward 22545).
- Plate 14. Pollen grains of the sections Dollinera, Kingianae and Sequax of *Desmodium*.  $\times 1000$ . a–d: *D. sequax* (Sasaki 849), e–h: *D. khasianum* (Hook. f. & Thoms. s.n.), i–k: *D. Kingianum* (Kerr 9086), l–n: *D. elegans* (subsp. *elegans* var. *Handelii*: Rock 8517), o–q: *D. megaphyllum* (o–q: Sørensen et al. 927; r: Iwatsuki & Fukuoka T.3210).
- Plate 15. a. *Arisaema intermedium* Blume.  
Phulchauki, Kathmandu, 2900 m (May 29, 1969).  $\times 5/12$ .  
b. The same, a female spadix with an appendage.  $\times 4/5$ .  
c. *Arisaema speciosum* Martius.  
Tiger Hill, Darjeeling, 2450 m (Jul. 26, 1969).  $\times 1/6$ .



- d. *A. speciosum* var. *mirabile* Engler, a spathe and an appendage of spadix. Tendong Peak, Sikkim, 2900 m (Jun. 29, 1969).  $\times 2/3$ .

Plate 16. a. *Arisaema ostiolatum* Hara.

Sabargan, the Singalila Range, 3400 m (Jul. 19, 1969).  $\times 1/3$ .

- b. The same, a longitudinally dissected spathe and a female spadix with an appendage.  $\times 1$ .

c. *Arisaema propinquum* Schott.

Sandakphu, the Singalila Range, 3900 m (Jul. 14, 1969).  $\times 1$ .

Plate 17. a. *Arisaema costatum* Wallich.

Shioupuri, Kathmandu, 2600 m (Jun. 15, 1969).  $\times 5/12$ .

- b. A female spadix with an appendage.

Phulchauki, Kathmandu, 2950 m (Jun. 10, 1969).  $\times 1$ .

- c. A part of the underside of leaf showing veins. Magnified.

- d. A spathe seen from the back.  $\times 2/3$ .

- e. A male spadix.  $\times 3/2$ . c-d, from Thare, Gosainkund, C. Nepal, 2200 m (Jun. 3, 1969).

Plate 18. a. *Arisaema Jacquemontii* Blume.

Tonglu, the Singalila Range, 3000 m (Jul. 12, 1969).

- b. *Arisaema nepenthoides* Martius.

Shioupuri, Kathmandu, 2600 m (Jun. 14, 1969).  $\times 1$ .

- c. *Arisaema utile* Hook. f.

Phulchauki, Kathmandu, 2700 m (May. 29, 1969).  $\times 2/5$ .

Plate 19. a. *Arisaema concinnum* Schott.

Shioupuri, Kathmandu, 2600 m (Jun. 14, 1969).  $\times 1/3$ .

- b. The same species.

Meghma—Chitrey, the Singalila Range, 2800 m (Jul. 22, 1969).  $\times 1/4$ .

- c. *Arisaema consanguineum* Schott, a narrow-leaved form.

Peshok Road—Ghum, Darjeeling, 2300 m (Jul. 7, 1969).  $\times 1/3$ .

- d. The same, showing a drooping fruiting peduncle.  $\times 1/2$ .

Plate 20. a. *Arisaema exappendiculatum* Hara.

E. Nepal, cult. in Tokyo (Jun. 21, 1964).  $\times 1/5$ .

- b. The same.  $\times 1/2$ .

- c. *Arisaema echinatum* Schott, an appendage of a spadix showing an echinulate apical part.  $\times 3/2$ .

- d. The same.

Phulchauki, Kathmandu, 2800 m (Jun. 10, 1969).  $\times 1$ .

Plate 21. Photomicrographs of chromosomes.

- a. *Ranunculus pulchellus* var. *Stracheyanus* Sabargan, the Singalila Range.  $\times 1600$ .

- b. *Ranunculus adoxifolius*. Sandakphu, the Singalila Range.  $\times 1600$ .

- c. *Ranunculus Brotherusi*. Sandakphu, the Singalila Range.  $\times 1600$ .

- d. *Podophyllum hexandrum*. Barshong, Bhutan.  $\times 1400$ .

- e. *Podophyllum hexandrum*. Gulmarg, Kashmir.  $\times 1400$ .

- f. *Desmodium podocarpum* subsp. *oxyphyllum*. Orchid Sanctuary, Gangtok, Sikkim.

$\times 1900$ .

Plate 22. Photomicrographs of chromosomes.

- a. *Panax pseudo-ginseng*. Shioupuri, Kathmandu, C. Nepal.  $\times 1300$ .

- b. *Panax pseudo-ginseng* var. *angustifolius*. Darjeeling.  $\times 1300$ .

- c. The same, PMC, Darjeeling.  $\times 1300$ .

- d. *Aucuba japonica*. Mt. Katsûdake, Okinawa, Ryukyu.  $\times 1800$ .

- e. *Lysimachia prolifera*. Garibas—Tonglu, the Singalila Range.  $\times 1700$ .
- f. *Artemisia indica*. Kalapokhari, the Singalila Range.  $\times 2000$ .

Plate 23. Photomicrographs of chromosomes.

- a. *Arisaema intermedium*. Phulchauki, Kathmandu, C. Nepal.  $\times 2000$ .
- b. *Disporum cantoniense*. Tendong, Sikkim.  $\times 800$ .
- c. *Streptopus simplex*. Sandakphu, the Singalila Range.  $\times 1500$ .
- d. *Paris polyphylla* subsp. *marmorata*. Pele La, Bhutan.  $\times 1200$ .
- e. *Polygonatum graminifolium*. Gosainkund, C. Nepal.  $\times 1500$ .
- f. *Allium Wallichii*. Gosainkund, C. Nepal.  $\times 1500$ .

Plate 24. Photomicrographs of chromosomes.

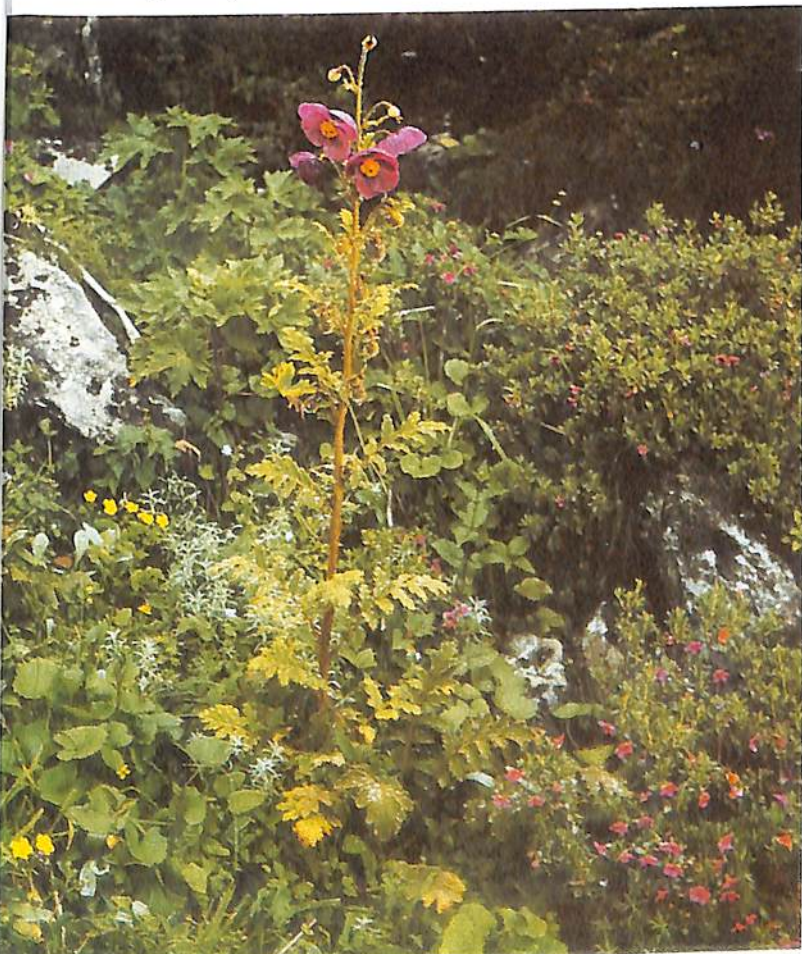
- a. *Trillium Govanianum*. Sandakphu, the Singalila Range.  $\times 700$ .
- b. *Trillium Tschonoskii* var. *himalaicum*. Pele La, Bhutan.  $\times 700$ .
- c. *Iris japonica*. Darjeeling.  $\times 1600$ .
- d. *Iris Hookeriana*. Sonamarg, Kashmir.  $\times 1600$ .
- e. *Iris* sp. Near Lingshi, Bhutan.  $\times 1600$ .
- f. *Iris Clarkei*. Tonglu, the Singalila Range.  $\times 1600$ .

Plate 2.

a. *Aruncus dioicus*  
subsp. *triternatus*  
at the edge of the forest  
of *Rhododendron campanulatum*



b. *Meconopsis napaulensis* f. *fusco-purpurea*



c. *Meconopsis napaulensis*  
with white flowers





a. *Primula sikkimensis*

b. *Begonia flaviflora*



c. *Lonicera adenophora*



late 4.

*Benthamidia capitata*



b. *Ceropegia pubescens*

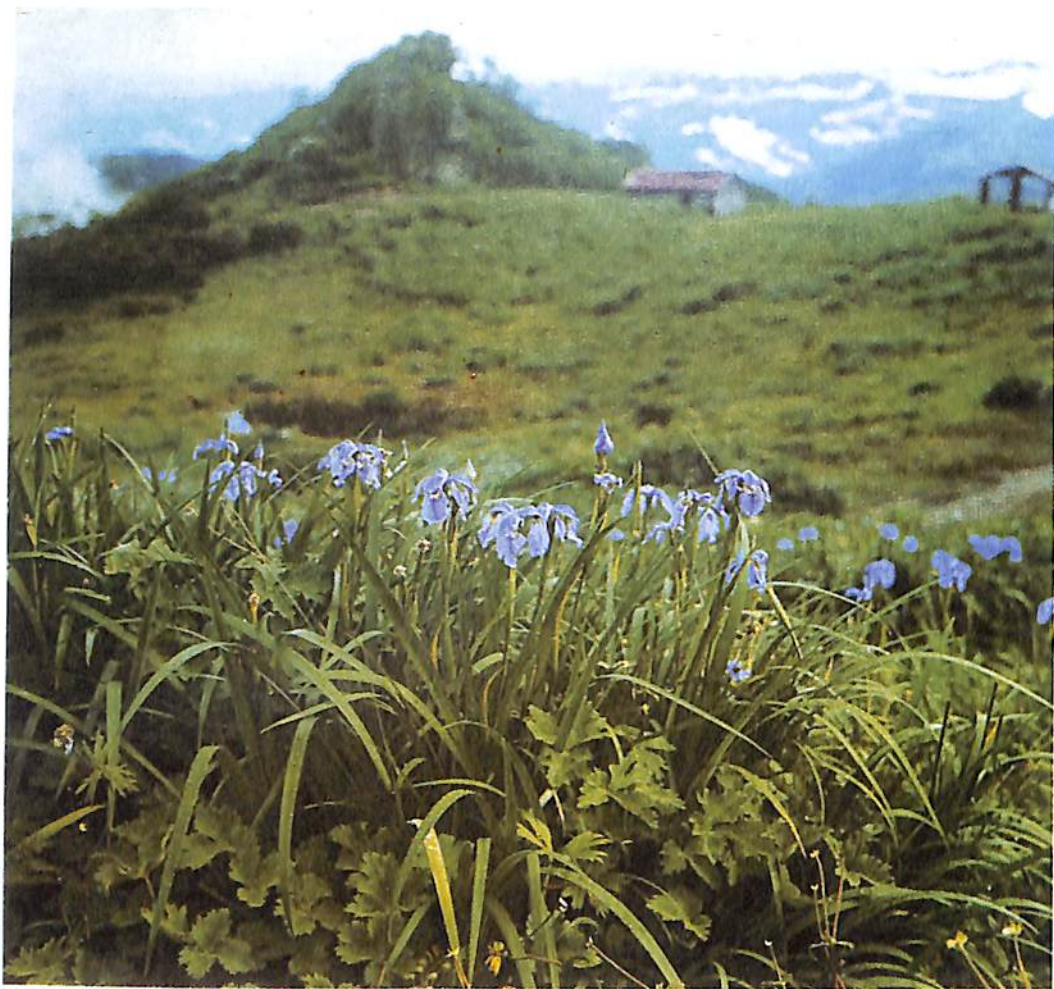


c. *Chirita macrophylla*



d. *Didymocarpus Andersoni*





a. *Iris Clarkei*

b. *Iris decora*





Plate 6. a. *Arisaema erubescens*

b. *Arisaema Griffithii* var. *verrucosum*

d. *Arisaema ostiolatum*

c. *Arisaema costatum*





a. *Galeola Lindleyana*

b. *Cardiocrinum giganteum*





Plate 8.



a. *Calanthe tricarinata*



b. *Calanthe tricarinata*

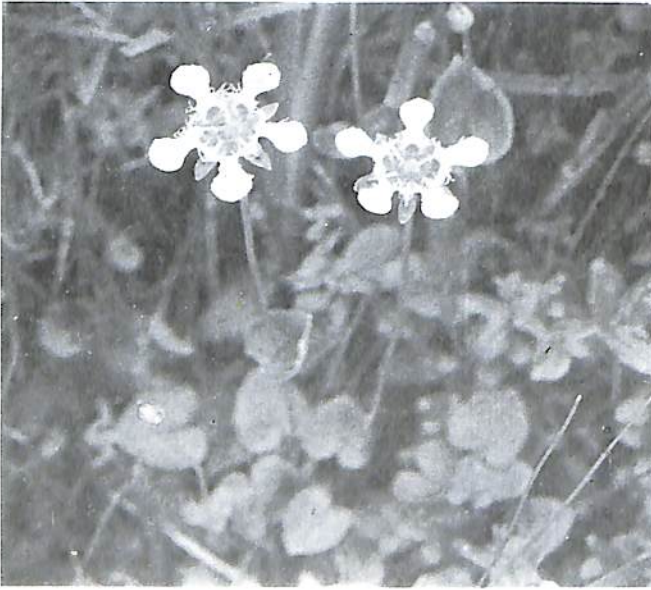
c. *Cephalanthera ensifolia*



d. *Orchis Chusua*



Plate 9. a. *Parnassia mysorens*



b. *Parnassia Wightiana*

c. *Chrysosplenium singalilense*



d. *Stilbanthus scandens*

e. *Acomastylus sikkimensis*

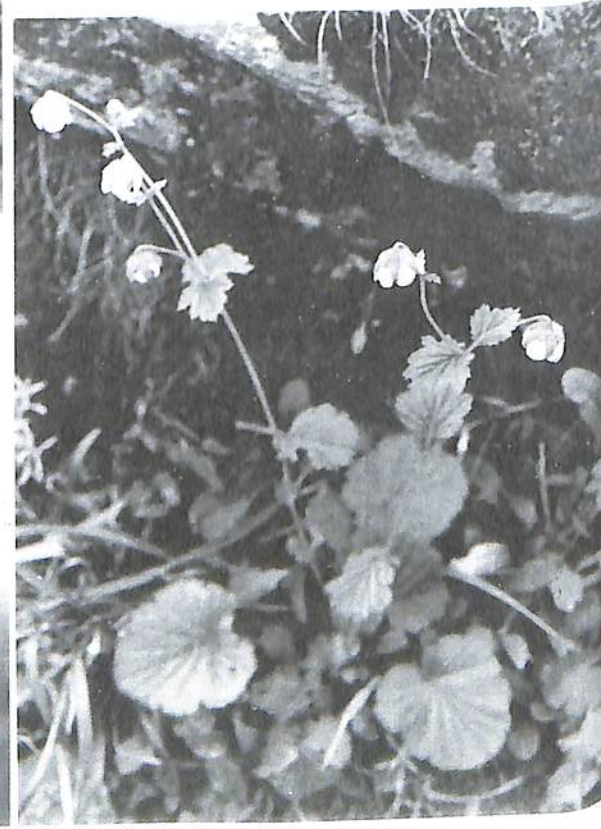
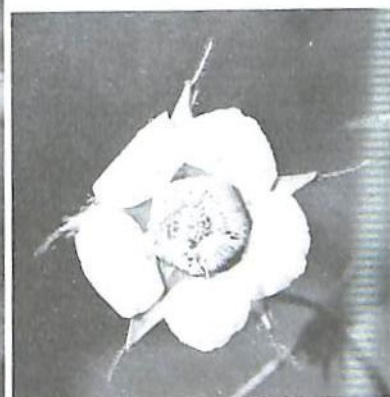


Plate 10.

a. *Rubus lineatus*

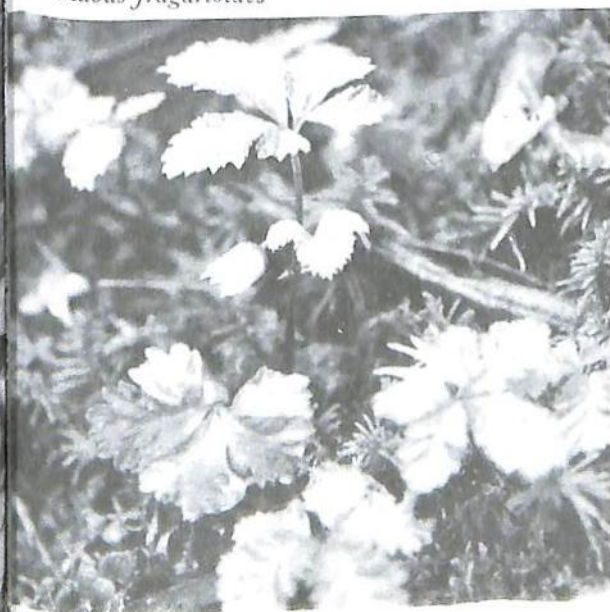


b. *Rubus splendidissimus*



c. *Rubus gigantiflorus*

d. *Rubus fragarioides*

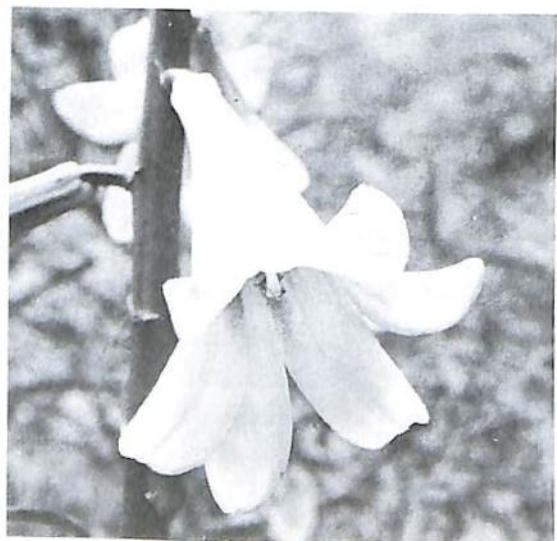


e. *Rubus Fockeanus*





a. *Streptopus simplex*



b,c. *Cardiocrinum giganteum*



d. *Ophiopogon parviflorus*





Plate 12. a. *Polygonatum verticillatum*

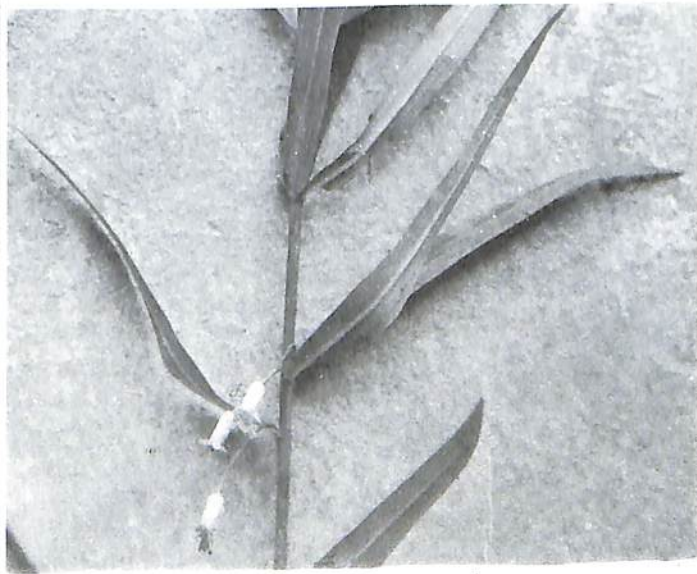


c. *Polygonatum singalilense*

b. *Polygonatum verticillatum*



d. *Polygonatum verticillatum*



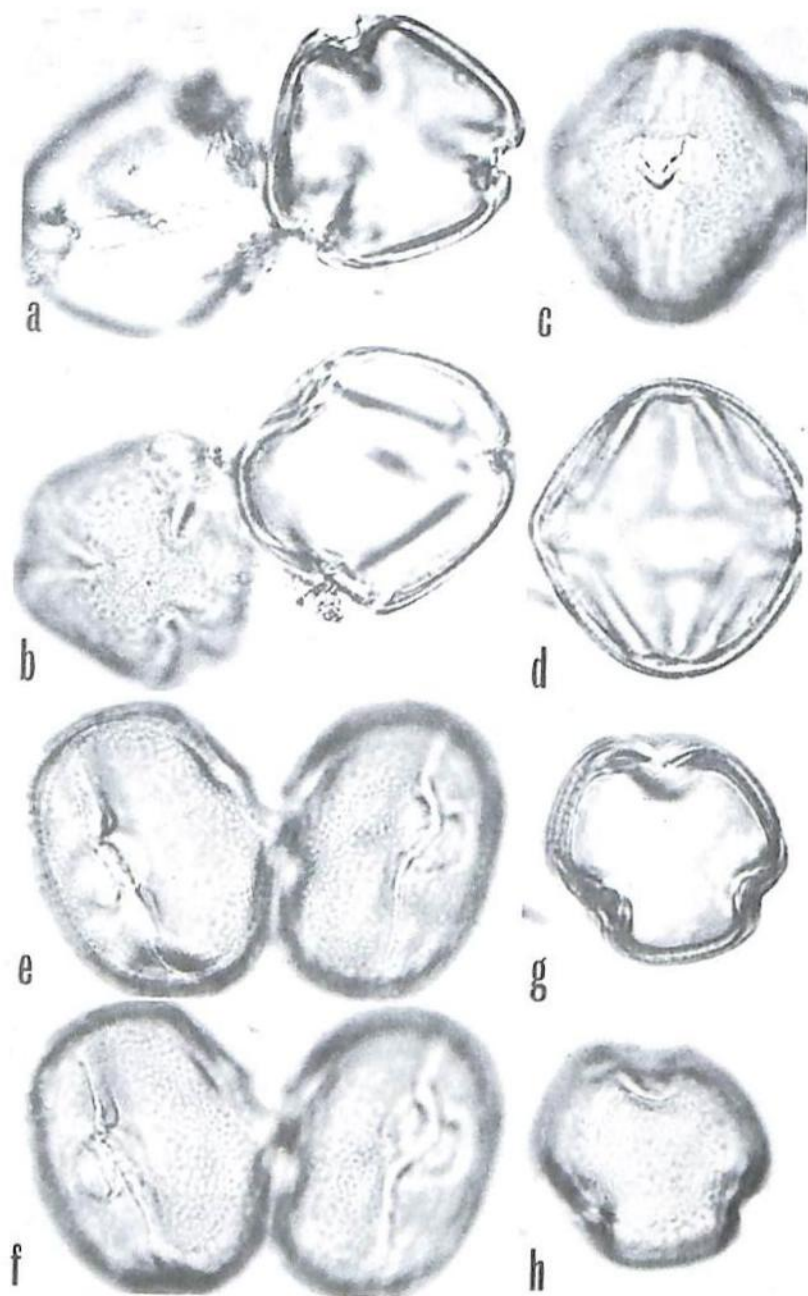


Plate 13. Pollen grains of *Dollinera* of *Desmodium*,  $\times 1000$ .  
 a-d: *D. amethystinum* (Garrett 53),  
 e-h: *D. multiflorum* (Kingdon-Ward 22545).

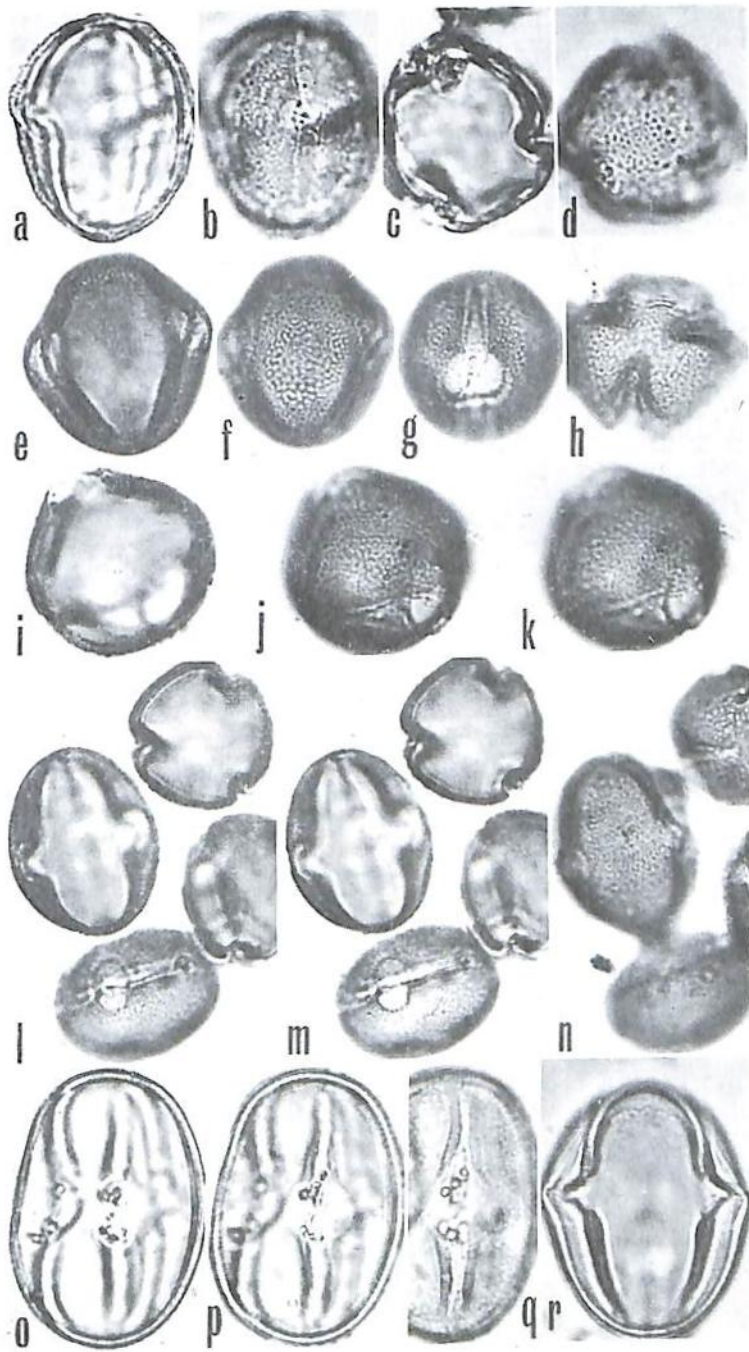


Plate 14. Pollen grains of Dollinera, Kingianae and Sequax of *Desmodium*.  $\times 1000$ . a-d: *D. sequax* (Sasaki 849), e-h: *D. khasianum* (Hook. f. & Thoms. s.n.), i-k: *D. Kingianum* (Kerr 9086), l-n: *D. elegans* (subsp. *elegans* var. *Handelii*: Rock 8517), o-r: *D. megaphyllum* (o-q: Sorensen et al. 927; r: Iwatsuki & Fukuoka T.3210).



a

a. *Arisaema intermedium*



c

c. *Arisaema speciosum*

d. *A. speciosum* var. *mirabile*

b. *Arisaema intermedium* a female spadix

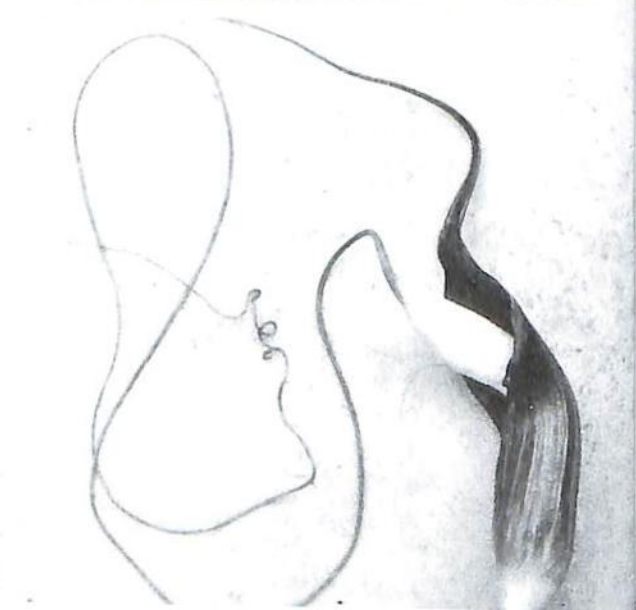
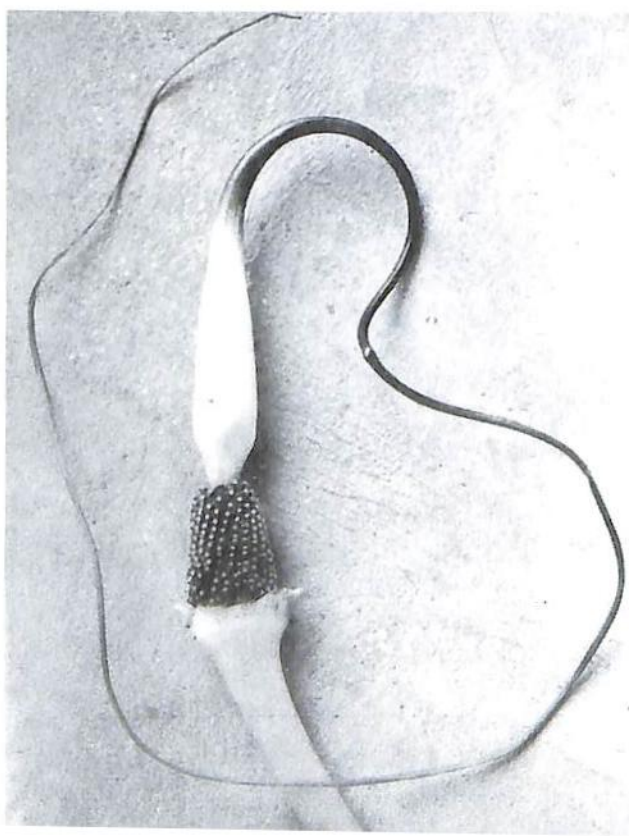


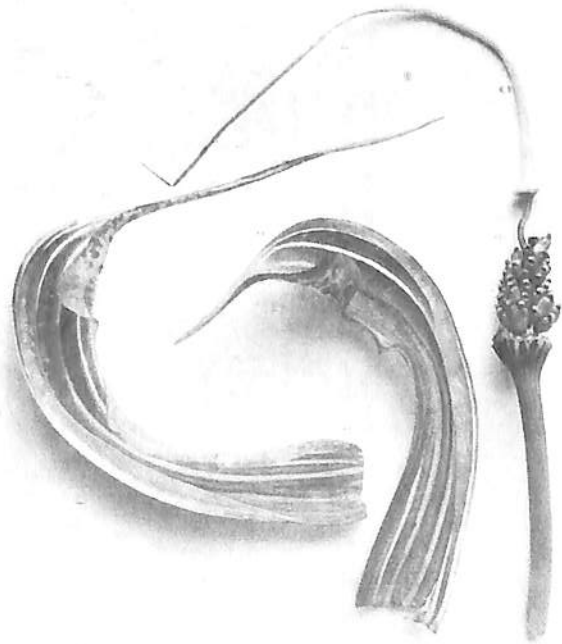


Plate 16.

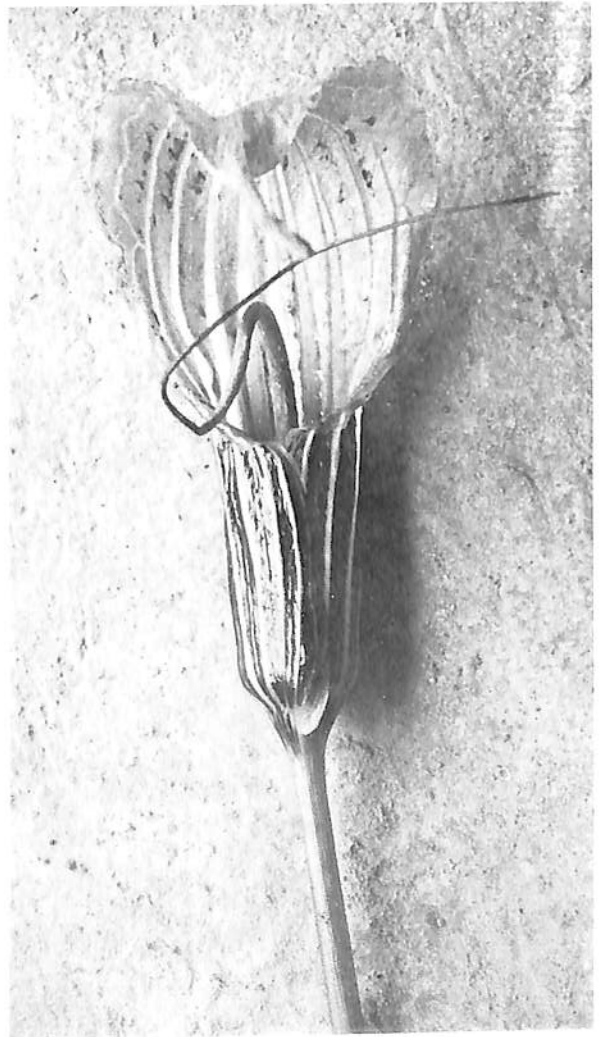
a. *Arisaema ostiolatum*



b. *Arisaema ostiolatum*



c. *Arisaema propinquum*

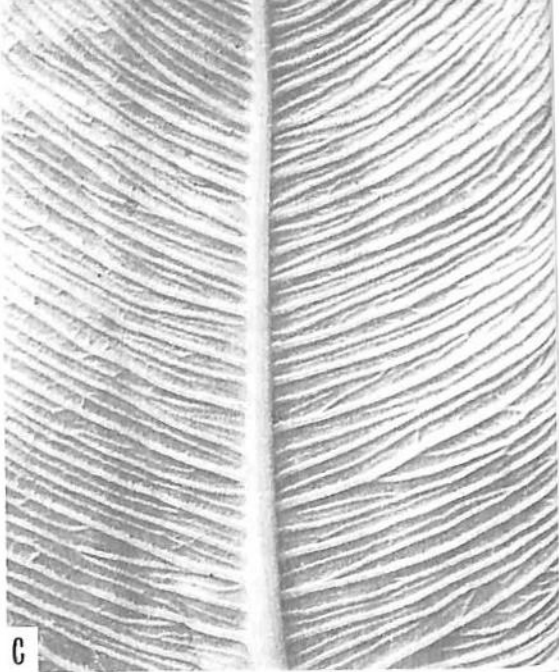




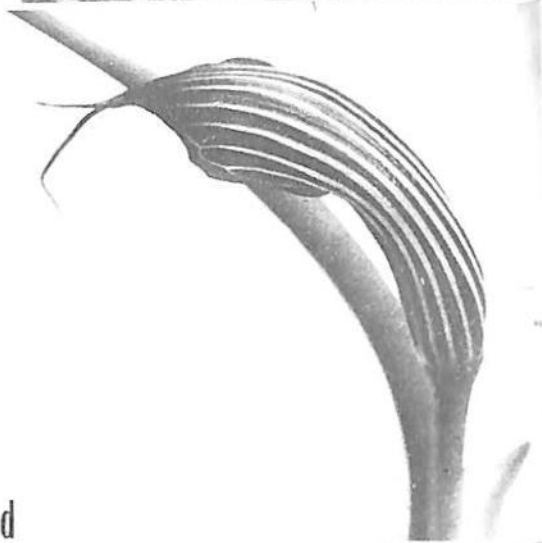
a

Plate 17.

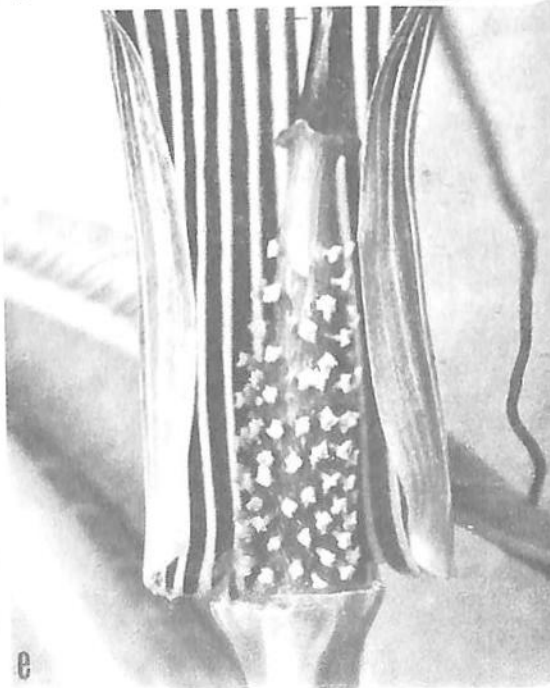
a. - c. *Arisaema costatum*



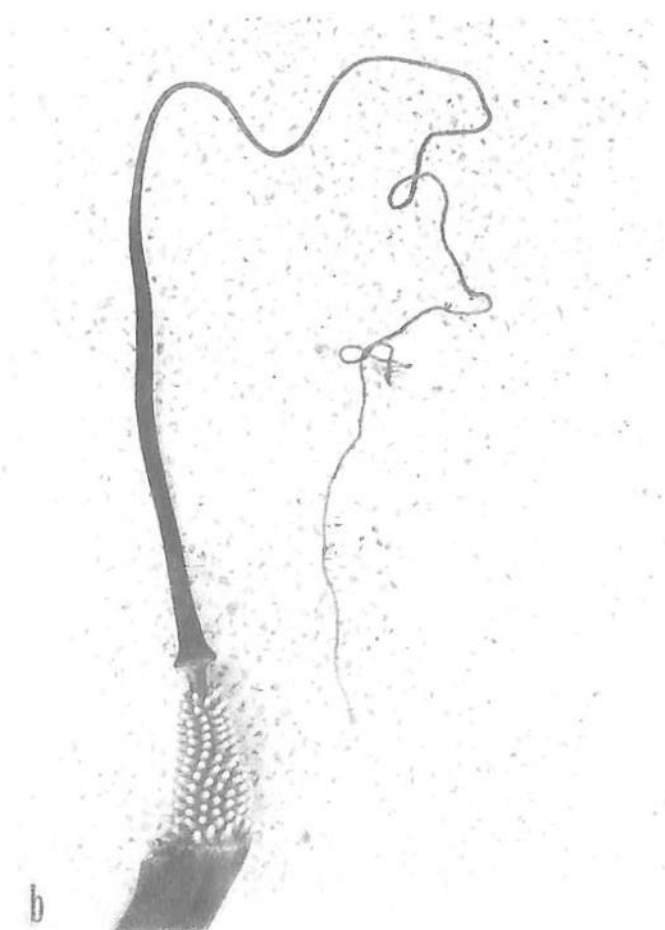
c



d



e

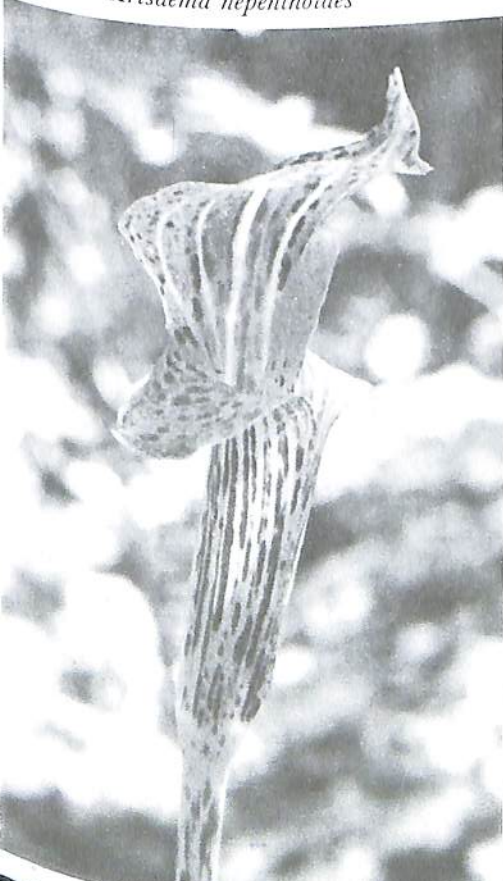


b



a. *Arisaema Jacquemontii*

b. *Arisaema nepenthoides*



c. *Arisaema utile*

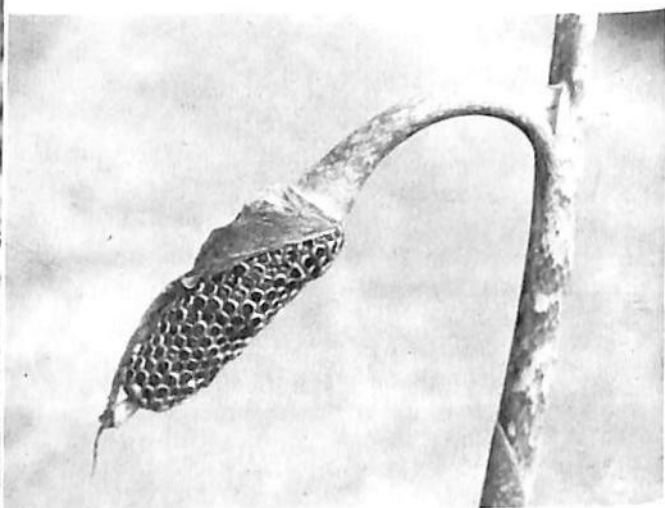




Plate 19. a. *Arisaema concinnum*



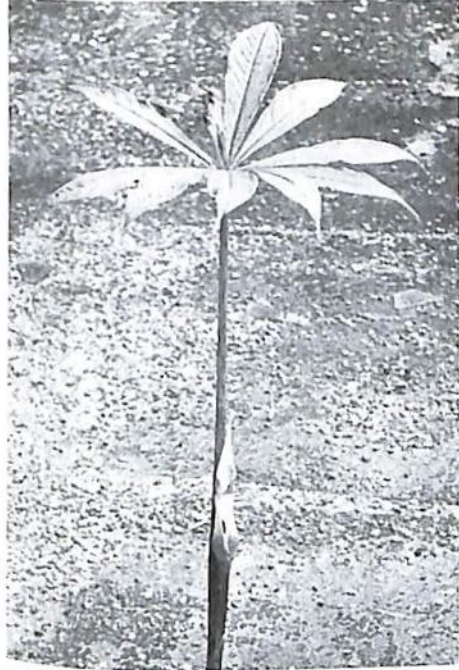
b. *Arisaema concinnum*



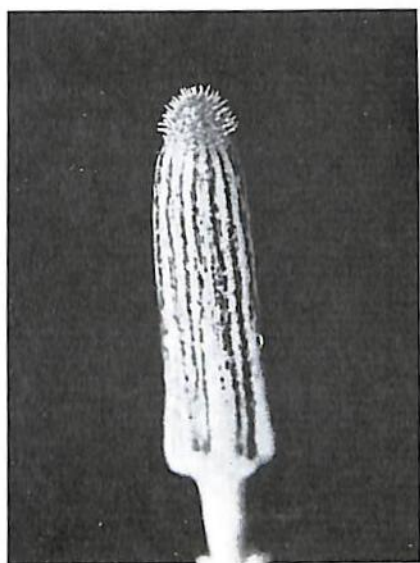
d. *Arisaema consanguineum*



c. *Arisaema consanguineum*



a. *Arisaema exappendiculatum*



c,d. *Arisaema echinatum*

b. *Arisaema exappendiculatum*



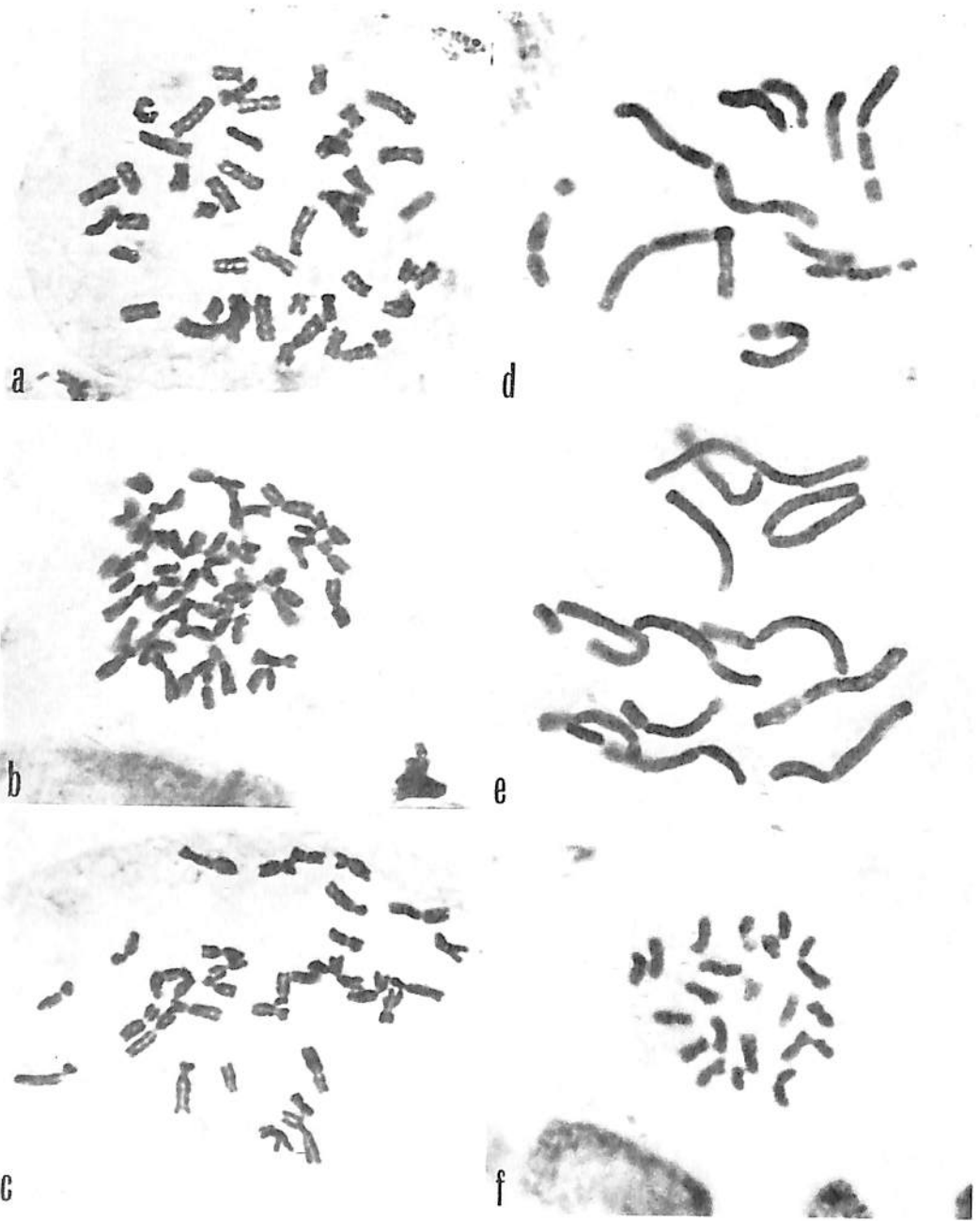


Plate 21. Photomicrographs of chromosomes.

- |   |  |
|---|--|
| a. <i>Ranunculus pulchellus</i> var. <i>Stracheyanus</i> . ×1600. | b. <i>Ranunculus adoxifolius</i> . ×1600.                        |
| c. <i>Ranunculus Brotherusi</i> . ×1600.                          | d. <i>Podophyllum hexandrum</i> . ×1400.                         |
| e. <i>Podophyllum hexandrum</i> . ×1400.                          | f. <i>Desmodium podocarpum</i> subsp. <i>oxyphyllum</i> . ×1900. |

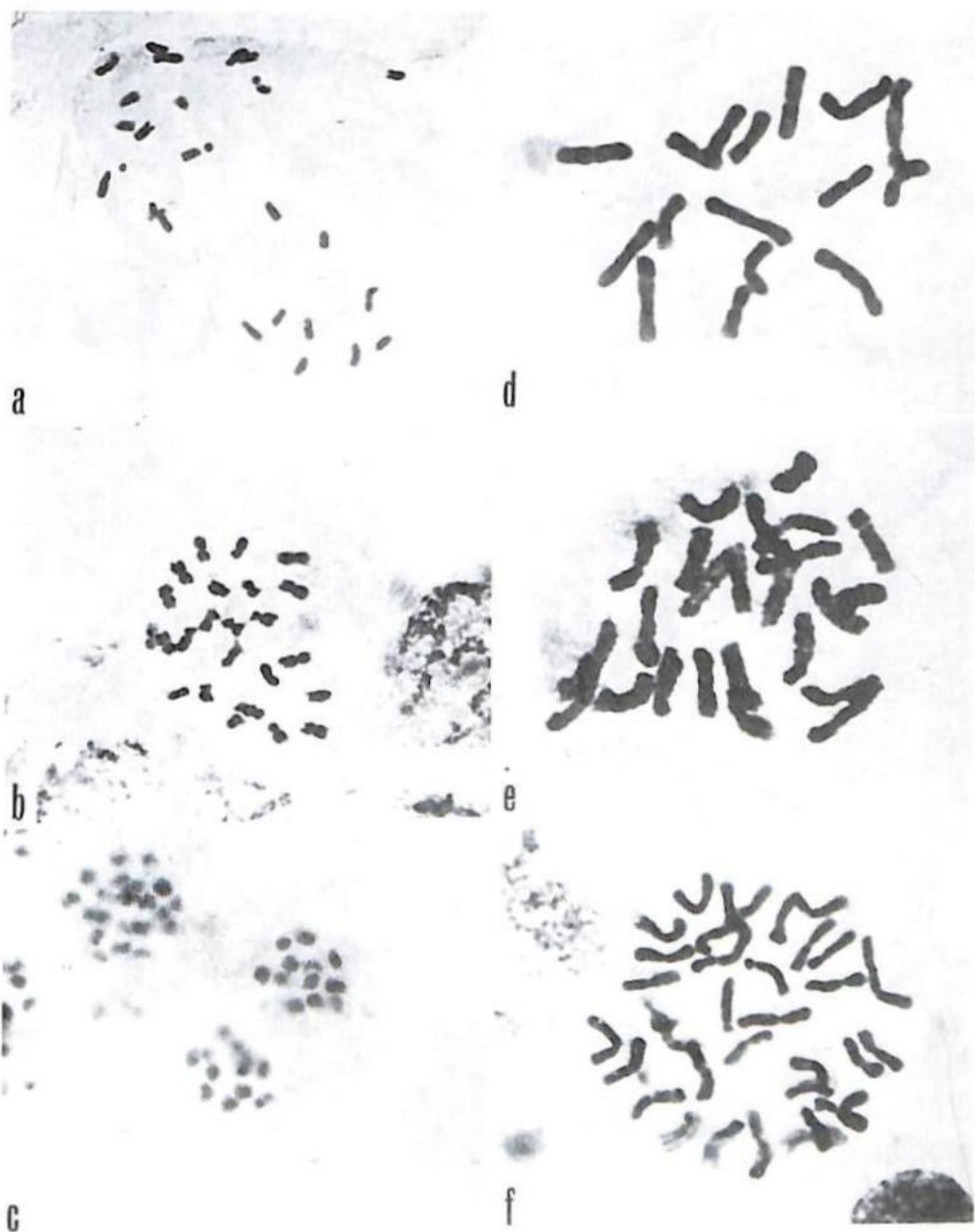


Plate 22. Photomicrographs of chromosomes

- |  |   |
|--|---|
| a. <i>Panax pseudo-ginseng</i> . ×1300.  | b. <i>Panax pseudo-ginseng</i> var. <i>angustifolius</i> . ×1300. |
| c. The same, PMC. ×1300.                 | d. <i>Aucuba japonica</i> . ×1800.                                |
| e. <i>Lysimachia proliifera</i> . ×1700. | f. <i>Artemisia indica</i> . ×2000.                               |



Plate 23. Photomicrographs of chromosomes

- a. *Arisaema intermedium*.  $\times 2000$ .  
 c. *Streptopus simplex*.  $\times 1500$ .  
 e. *Polygonatum graminifolium*.  $\times 1500$ .

- b. *Disporum cantoniense*.  $\times 800$ .  
 d. *Paris polyphylla* subsp. *marmorata*.  $\times 1200$ .  
 f. *Allium Wallichii*.  $\times 1500$ .



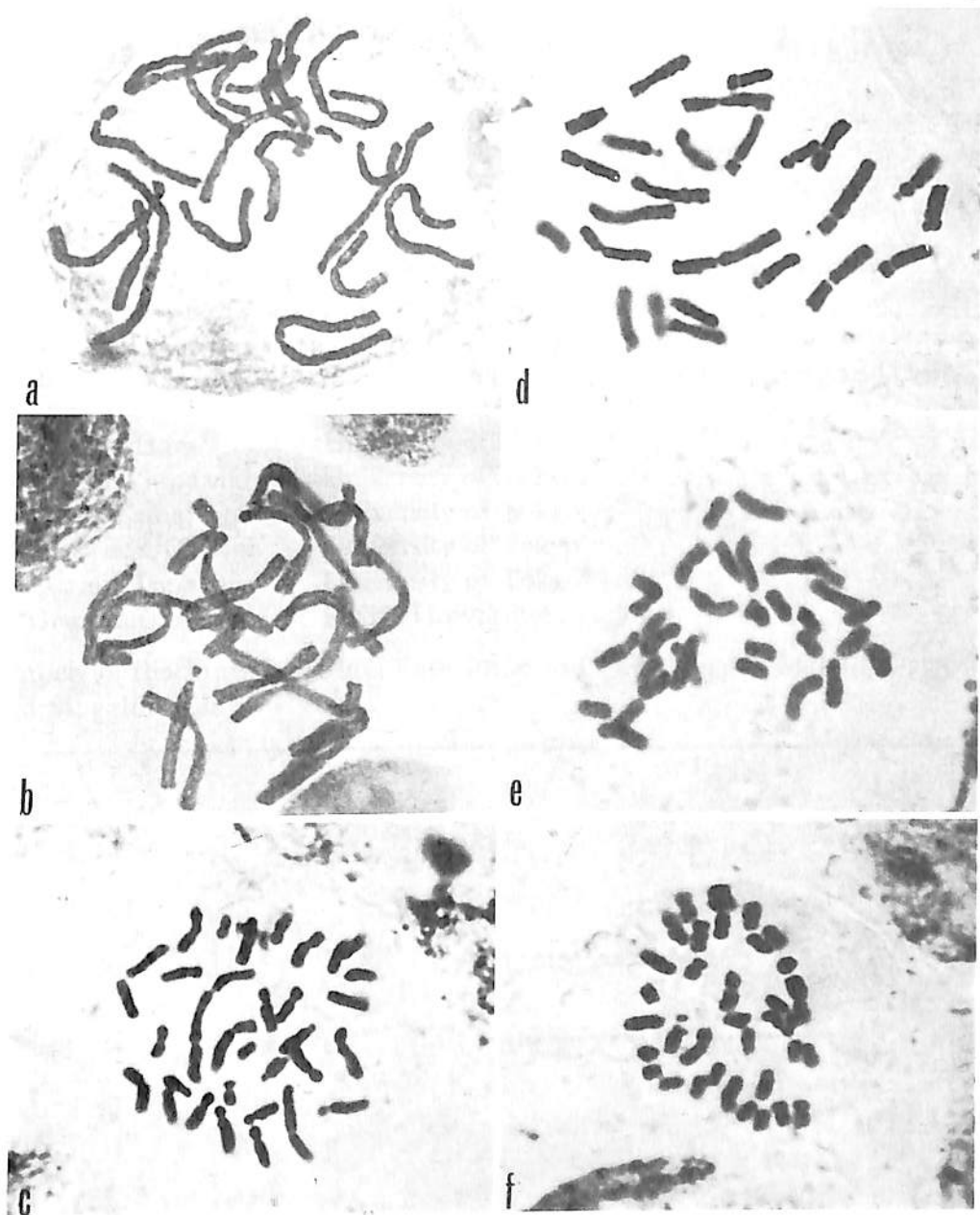


Plate 24. Photomicrographs of chromosomes

- a. *Trillium Govanianum*.  $\times 700$ .  
 b. *Trillium Tschonoskii* var. *himalaicum*.  $\times 700$ .  
 c. *Iris japonica*.  $\times 1600$ .  
 d. *Iris Hookeriana*.  $\times 1600$ .  
 e. *Iris* sp.  $\times 1600$ .  
 f. *Iris Clarkei*.  $\times 1600$ .

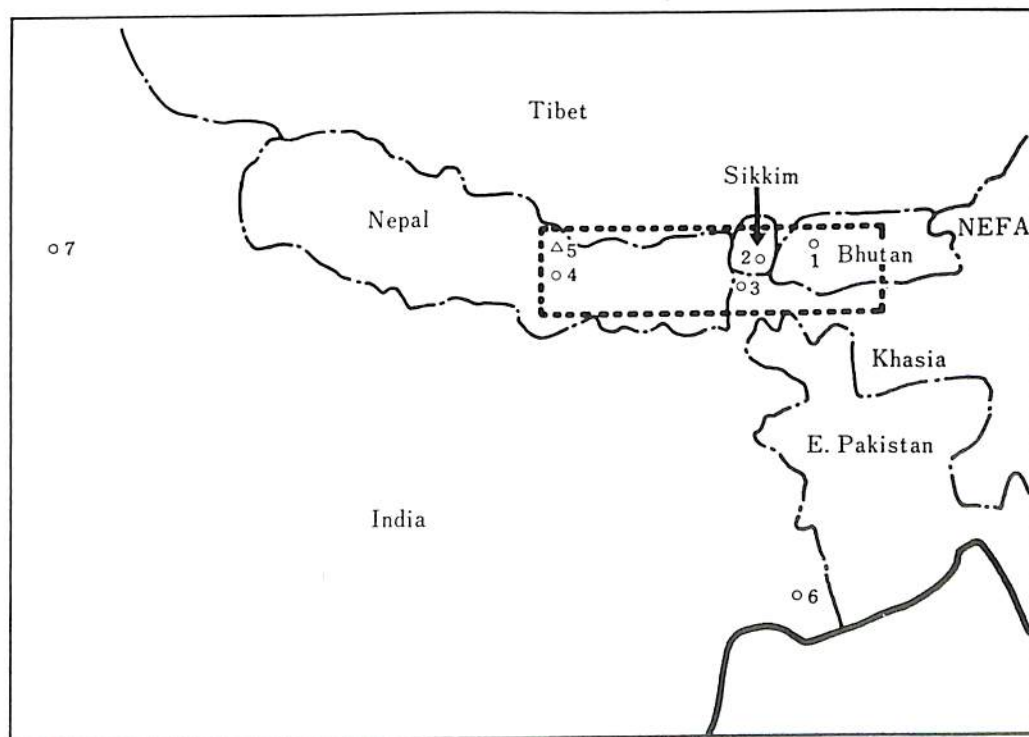
# MEMBERS AND ITINERARIES

## BOTANICAL EXPEDITIONS TO EASTERN HIMALAYA 1967 AND 1969

Members of the March–June 1967 Expedition to Bhutan, Darjeeling and Central Nepal.

Hiroshi Hara	University of Tokyo
Takasi Yamazaki	University of Tokyo
Hiroo Kanai	University of Tokyo
Hiroyoshi Ohashi	University of Tokyo
Osamu Tanaka	University of Tokyo
Gen Murata	Kyoto University

Members of the May–July 1969 Expedition to Central Nepal, Sikkim, Darjeeling and Singalila Range.



- |               |               |
|---------------|---------------|
| 1. Thimphu    | 5. Gosainkund |
| 2. Gangtok    | 6. Calcutta   |
| 3. Darjeeling | 7. Delhi      |
| 4. Kathmandu  |               |

Fig. 1. Sketch map showing our investigated area and its neighboring regions.

Hiroshi Hara                      University of Tokyo  
 Sachiko Kurosawa                University of Tokyo  
 Hiroyoshi Ohashi                University of Tokyo

Information on the members and itineraries of Botanical Expeditions between 1960 and 1964 is given in the first volume of "The Flora of Eastern Himalaya" pp. 1-12 (1966).

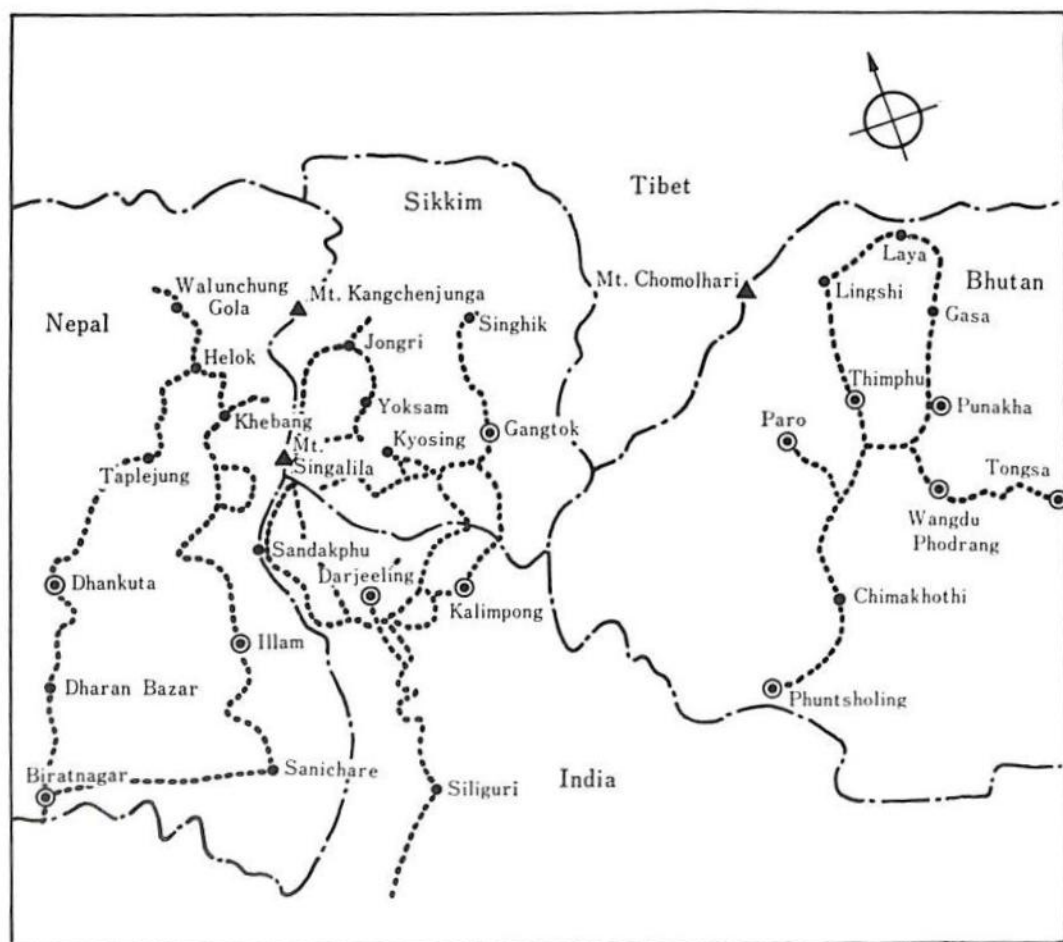


Fig. 2. Our itineraries in E. Nepal, Sikkim, and Bhutan between 1960 and 1969.

The Third Botanical Expedition to Eastern Himalaya, March-June, 1967.

Members: Hiroshi Hara (*H*), Hiroo Kanai (*K*), Gen Murata (*M*), Hiroyoshi Ohashi (*O*), Osamu Tanaka (*T*), and Takasi Yamazaki (*Y*). (Italicized capital letters indicate name abbreviations).

March 21 1967	<i>H</i>	Calcutta→Darjeeling (2150 m)
24		Darjeeling⇌Senchal (2450 m)⇌Ghum (2300 m)
25		Darjeeling (Birch Hill 2100 m)
26		Darjeeling→Calcutta

April 2 1967

- 2 *HKMOTY* Calcutta→Hashimara→Phuntsholing (300 m)  
 3 Phuntsholing (300⇌900 m)  
 4 Phuntsholing (300 m)→Putli Bhir (2200 m)→Pasikha (1900 m)→  
 Chhukha Dzong→Thargyal Mathur Bridge (1700 m)→Chima-  
 khoti (2350 m)  
 5 Chimakhoti (2350 m)→Bunakha (2200 m)→Tanalum Bridge  
 (2200 m)→Kypacha→Nimchling (2350 m)→Thimphu (2450 m)  
 6 Thimphu (2450 m)  
 7 *HMTY* Thimphu→Nimchling *KO* Thimphu (2450⇌2800 m)  
 (2350 m)→Paro (2500 m)  
 8 Paro (2500 m)→Thimphu  
 (2450 m)  
 9 *HKMOTY* Thimphu (2450 m)→Sintoka Dzong→Dochu La (3200 m)→  
 Yuwak (1600 m)→Wangdu Phodrang (1450 m)  
 10 Wangdu Phodrang (1450 m)→Water Fall (1500 m)→Nyatoka  
 (1500 m)→Kyebaka (1600 m)→Samtengang (2100 m)  
 11 Samtengang (2100 m)→Sena Thang (2600 m)→Tsarza La  
 (2800 m)→Ratsoo (2000 m)→Ritang (2600 m)  
 12 *KMOTY* Ritang (2600 m) *H* Ritang (2600 m)→Pele La  
 (3400 m)→Chendebi (2500 m)  
 13 Ritang (2600 m)→Pele La Chendebi (2500 m)→  
 (3400 m)→Rukubi (2800 m) Tashiling (2300 m)  
 14 Rukubi (2800 m)→Chendebi Tashiling (2300 m)→Tongsa  
 (2500 m)→Charikhachor Bridge (1900 m)→Tongsa  
 (2450 m)→Neylong (2400 m) (2200 m)  
 15 Neylong (2400 m)→Tashiling Tongsa (2200 m)→Tashiling  
 (2300 m) (2300 m)  
 16 Tashiling (2300 m)→Tongsa Tashiling (2300 m)→  
 Bridge (1900 m)→Tongsa Chendebi (2500 m)→Rukubi  
 (2200 m) (2800 m)  
 17 Tongsa *KY* Tongsa⇌Tratang Rukubi (2800)→Pele La  
 (2200 m) (2700 m)⇌Uto La (3400 m)→Ritang (2600 m)  
 Road (2950 m) →Ratsoo (2000 m)  
 18 *MO* Tongsa⇌Tratang Ratsoo (2000 m)→Tsarza La  
 (2700 m) (2800 m)→Samtengang  
 (2100 m)→Wangdu  
 Phodrang (1450 m)  
 19 *KMOTY* Tongsa (2200 m)→Tongsa Wangdu Phodrang (1250 m)  
 Bridge (1900 m)→Tashiling →Dochu La (3200 m)→  
 (2300 m) Thimphu (2450 m)  
 20 Tashiling (2300)→Neylong Thimphu (2450 m)  
 (2400 m)→Charikhachor  
 (2450 m)  
 21 Charikhachor (2450)→Chendebi Thimphu (2450 m)→Chima-  
 (2500 m)→Rukubi (2800 m) khoti (2350 m)  
 →Longtepang (3150 m)  
 22 Longtepang (3150 m)→Pele Chimakhoti (2350 m)→

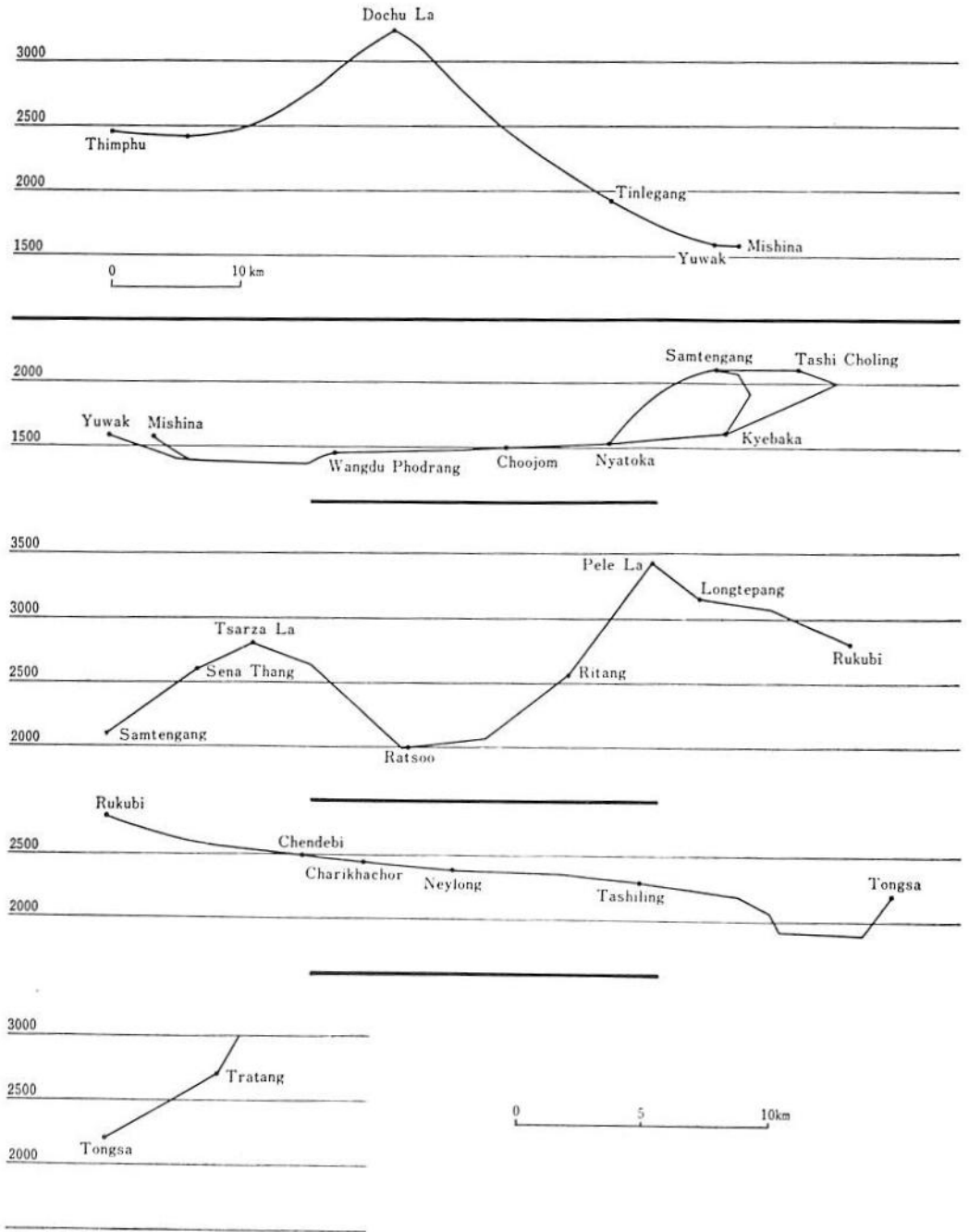


Fig. 3. Vertical route sections of the first trip of Bhutan in April of 1967.

	La (3400 m)→Ritang (2600 m)	Phuntsholing (300 m)
April 23 1967	Ritang (2600 m)→Ratsoo (2000 m)	H Phuntsholing (300 m)→ Siliguri (200 m)→ Darjeeling (2150 m)
24	Ratsoo (2000 m)	Darjeeling (2150 m)

April	25	1967	Ratsoo (2000 m)→Tsarza La (2800 m)→Sena Thang (2600 m)→Samtengang (2100 m)	<i>H</i>	Darjeeling (2150 m)→Rangpo (350 m)→Gangtok (Orchid Sanctuary 1600 m)
	26		<i>MOY</i> Samtengang (2100 m)→Tashi Choling (2100 m)→Kyebaka (1600 m)→Choojom (1500 m)		Gangtok (Rumtek, Saramsa 1050 m)
			<i>KT</i> Samtengang (2100 m)→Kyebaka (1600 m)→Choojom (1500 m)		
	27		<i>KMOTY</i> Choojom (1500 m)→Wangdu Phodrang (1450 m)→Mishina (1500 m)		Gangtok (1650 m)→Darjeeling (2150 m)
	28		Mishina (1500 m)→Dochu La (3200 m)→Thimphu (2450 m)		Darjeeling
	29		Thimphu		Darjeeling (Observatory Hill 2180 m)⇌Ghum (2300 m)⇌Tiger Hill (2500 m)
	30				Darjeeling (2150 m)
May	1	1967	Thimphu		Darjeeling (Ghose Nursery)
	2				Darjeeling→Bagdogra→Calcutta
	3		Thimphu (2450)→Dochu La (3200)→Tinlegang (1950 m)		
	4		Tinlegang (1950 m)		
	5		Tinlegang (1950 m)→Gon Chungnang (1800 m)		
	6		Gon Chungnang (1800 m)→Punakha (1400 m)		
	7		Punakha (1400 m)→Bhotokha (1450 m)		
	8		Bhotokha (1450 m)→Rinchu (1500 m)		
	9		Rinchu (1500 m)→Mishichen (1600 m)		
	10		Mishichen (1600 m)→Khosa (1800 m)		
	11		Khosa (1800 m)→Tamji (2200 m)		
	12		Tamji (2200 m)		
	13		Tamji (2200 m)→Zami Bridge (2250 m)→Gasa (2800 m)		
	14		Gasa (2800 m)→Pari La (3750 m)→Chamsa (3700 m)		
	15		Chamsa (3700 m)→Kohina (3200 m)→Yabu Thang (3400 m)		
	16		Yabu Thang (3400 m)→Tashi Ha (3400 m)→Laya (3850 m)		
	17		Laya (3850 m)		
	18		Laya (3850 m)→Laum Thang (4100 m)		
	19		Laum Thang (4100 m)→Singke La (5000 m)→Chawa Gassar (4200 m)		
	20		Chawa Gassar (4200 m)→Tharizaj Thang (3950 m)→Jari La (4750 m)→Seanchu Passa (3900 m)		
	21		Seanchu Passa (3900 m)→Gokhu La (4400 m)→Chabecha (3800 m)		
	22		Chabecha (3800 m)→Goy (3850 m)→Lingshi (4100 m)		
	23		Lingshi (4100 m)→Yale La (4800 m)→Shodu (4000 m)		
	24		Shodu (4000 m)→Barshong (3700 m)		
	25		Barshong (3700 m)→Nala (3300 m)		

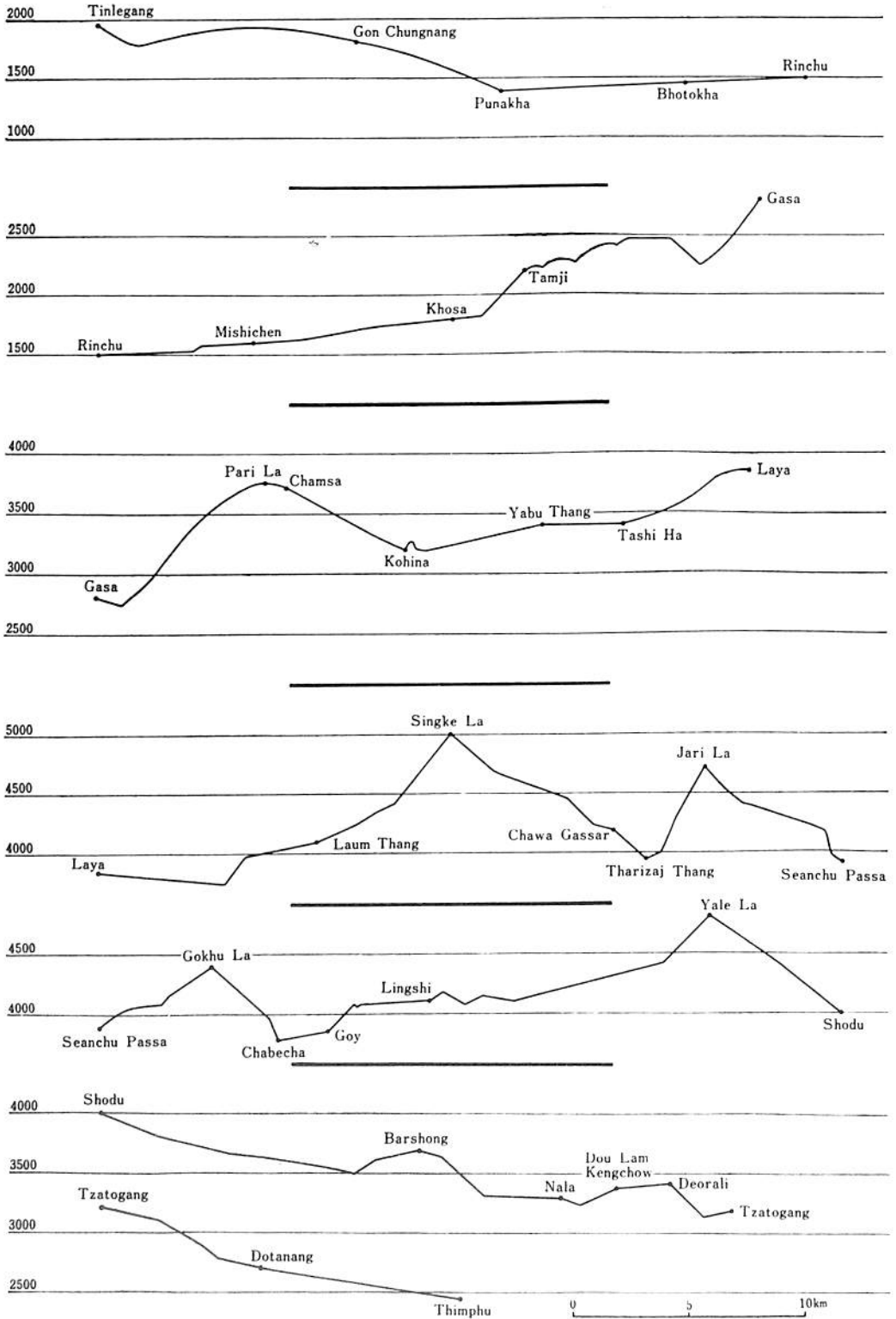


Fig. 4. Vertical route sections of the second trip of Bhutan in May of 1967.

May	26	1967	Nala (3300 m)→Dou Lam Kengchow (3400 m)→Tzatogang (3200 m)
	27		Tzatogang (3200 m)→Dotanang (2700 m)
	28		Dotanang (2700 m)→Tabab (2550 m)→Thimphu (2450 m)
	29		Thimphu (2450 m)
	30		<i>KMY</i> Thimphu (2450 m)⇌Dochu La (3200 m)
	31		Thimphu
June	1		Thimphu (2450 m)→Chimakhothi (2350 m)
	2		Chimakhothi (2350 m)→Phuntsholing (300 m)
	3		Phuntsholing (300 m)
	4		Phuntsholing
	5		<i>MOTY</i> Phuntsholing (300 m)→ <i>K</i> Phuntsholing→Hashimara→ Siliguri (200 m)→Darjeeling      Calcutta
	6		Darjeeling (2150 m)
	7		Darjeeling
	8		Darjeeling <i>MOY</i> Darjeeling⇌Ghum (2300 m) ⇌Tista Bazar (300 m)⇌Kalimpong (1300 m)
	9		Darjeeling
	10		Darjeeling→Calcutta
	14		<i>KMOTY</i> Calcutta→Kathmandu (1400 m)
	15		Kathmandu (1400 m)
			<i>KMT</i> Swayambhu Nath (1500 m) <i>MTY</i> Patan (1400 m)
	16		<i>KMY</i> Balaju (1300 m) <i>MOTY</i> Bhudh Nilkantha (1400 m)
	17		Chobar (1200 m)
	18		Kathmandu→Pokhara (900 m) (Pokhara Lake 900 m)
	19		Pokhara→Kathmandu
	20		Kathmandu (1400 m)⇌Kakani (2200 m) <i>MTY</i> Bodh Nath (1300 m)
	21		Kathmandu
			<i>KMTY</i> Gokarna (1400 m)
	23		<i>KMOY</i> Kathmandu⇌Godavari (1600 m)⇌ <i>T</i> Kathmandu→ Phulchauki (2500 m)      Calcutta
	24		Kathmandu→Nagarkot (2000 m)
	25		Nagarkot (2000 m)→Badgaon→Kathmandu
	26		Kathmandu⇌Godavari (1600 m)⇌Phulchauki (2700 m)
	27		Kathmandu→Calcutta

\*   \*   \*   \*   \*

The Fourth Botanical Expedition to Eastern Himalaya, May-July, 1969.  
Members: Hiroshi Hara (*H*), Sachiko Kurosawa (*K*), and Hiroyoshi Ohashi (*O*).

May	26	1969	<i>HKO</i> Kathmandu (1400 m)
	27		Kathmandu
	28		Kathmandu (Godavari Botanical Garden)
	29		Godavari→Phulchauki (2100 m⇌2800 m)
	30		Kathmandu
	31		Kathmandu



June	1	1969	Trisuli→Bainse (800 m)→Sim Chautara (Laharepoa 970 m)		
	2		Sim Chautara (970 m)→Ramche (1800 m)→Thare (2200 m)		
	3		Thare (2200 m)→Dhunche (2100 m)→Trisula Khola (2065 m)		
	4		Trisula Khola (2065 m)⇌Gosainkund (3000 m)		
	5		Trisula Khola (2065 m)→Dhunche (2100 m)→Thare (2200 m)		
	6		Thare (2200 m)→Grang (1900 m)→Ramche (1800 m)→Sim Chautara (970 m)		
	7		Sim Chautara (970 m)→Bainse (800 m)→Kathmandu		
	8		Kathmandu (1400 m)		
	9		Kathmandu		
	10		Godavari→Phulchauki (2600 m⇌2800 m)		
	11		Kathmandu (1400 m)		
	12		Kathmandu (Swayambhu Nath, Patan)		
	13		Kathmandu		
	14		Kathmandu		
			O Kathmandu→Shioupuri (2700 m)	H Kathmandu→ Calcutta	
	15		Shioupuri (2700 m)→Kathmandu		
	16	KO	Kathmandu		
	17		Kathmandu		
	18		Kathmandu→Calcutta		
	22	HKO	Calcutta→Darjeeling		
	23		Darjeeling (2150 m)		
	24		Darjeeling (Birch Hill 2100 m, Lloyd Botanical Garden)		
	25		Darjeeling (Observatory Hill, Ghose Nursery)		
	26		Darjeeling→Kalimpong→Pakhyon (1700 m)→Gangtok (1700 m)		
	27		Gangtok (Orchid Sanctuary 1600 m, Rumtek, Martam 1800 m)		
	28		Gangtok→Namli (900 m)→Middle Camp (800 m)→Papung (500 m)→Temi (1620 m)		
	29		Temi→Damthang (2150 m)⇌Tendong (2900 m)→Temi→Gangtok		
	30		Gangtok→Rangrang (900 m)→Singhik (1500 m)		
	July	1		Singhik (1500 m)→Phyang La (1900 m)→Gangtok	
		2		Gangtok→Kalimpong→Darjeeling	
3			Darjeeling (2150 m)		
4			Darjeeling		
5			Darjeeling (East Birch Hill Road 2100 m)		
6			Darjeeling (Senchal 2400 m→Ghum 2300 m)		
7			Darjeeling (Peshok Road 2250 m→Ghum 2300 m)		
8			Darjeeling		
9			Darjeeling (Tenzin Norgye Road 2150 m)		
10			Darjeeling		
11			Mane Bhanjang (2200 m)→Chitrey (2600 m)→Meghma (2850 m)→Tonglu (3150 m)		
12			Tonglu (3100 m⇌2800 m)		
13			Tonglu (3100 m)→Garibas (2800 m)→Kalapokhari (3100 m)→Sandakphu (3970 m)		
14			Sandakphu (3970 m⇌3800 m)		
15			Sandakphu (3970 m⇌3800 m)		
16			Sandakphu→Sabargan (3300 m)→Phalut (3930 m)		

July	17	1969	Phalut (3930 m) ⇌ Mt. Singalila (3980 m)
	18		Phalut (3930 m) ⇌ 3800 m)
	19		Phalut (3930 m) → Sabargan (3300 m) → Sandakphu (3970 m)
	20		Sandakphu (3970 m) ⇌ 3800 m)
	21		Sandakphu (3970 m) → Kalapokhari (3100 m) → Garibas (2800 m) → Tonglu (3150 m)
	22		Tonglu (3150 m) → Chitrey (2600 m) → Mane Bhanjang (2200 m) → Darjeeling
	23		Darjeeling (2150 m)
	24		Darjeeling (East Birch Hill Road 2100 m)
	25		Darjeeling
	26		Darjeeling (Senchal 2400 m ⇌ Tiger Hill 2500 m → Ghum 2300 m)
	27		Darjeeling
	28		Darjeeling
	29		Darjeeling (East Birch Hill Road 2100 m)
	30		Darjeeling → Bagdogra → Calcutta