

EXPLANATION OF PLATES

- Plate 1. a. *Rheum nobile* Hook. f. et Thoms.
Thudam—Kipuphu, 4200 m (Jun. 26, 1972). $\times 1/10$.
b. A part of the inflorescence showing male panicle, bracts in front removed.
 $\times 1/4$.
- Plate 2. a. *Bistorta amplexicaulis* (D. Don) Greene var. *pendula* Hara.
Gopte—Thale Patil, 3500–3200 m (Aug. 26, 1972). $\times 1/4$.
b. *Clematis alternata* Kitamura et Tamura.
Khirojet—Yatumbal, 2600 m (Jun. 29, 1970). $\times 6/5$.
c. *Salix anticecrenata* Kimura mstr. *monadelpha* Kimura.
Banduke Pokhari—Saju Pokhari, 4200–4000 m (Jun. 15, 1972). $\times 1$.
- Plate 3. a. *Meconopsis horridula* Hook. f. et Thoms.
Jalang Chhyongo—Thudam, 4400 m (Jun. 21, 1972). $\times 1/2$.
b. *Meconopsis discigera* Prain.
Samdan, 4400 m (Jun. 24, 1972). $\times 1/4$.
c. *Sedum bupleuroides* Wall. ex Hook. f. et Thoms.
Gosainkund—Gopte, 4200–3500 m (Aug. 25, 1972). $\times 1/4$.
d. *Sedum linearifolium* Royle.
Thale Patil—Hile Dhap, 3400 m (Aug. 27, 1972). $\times 6/5$.
- Plate 4. a. *Gueldenstaedtia himalaica* Baker.
Topke Gola, 3600 m (Jun. 17, 1972). $\times 1$.
b. *Hedysarum sikkimense* Benth. ex Baker.
Lama Chungbu—Thudam, 4000 m (Jun. 24, 1972). $\times 1$.
c. *Geranium Lambertii* Sweet.
Singum Gompa, 3200 m (Aug. 22, 1972). $\times 2/5$.
d. *Geranium procurrens* P. F. Yeo.
Mangen—Khodang Danda, 3100–2500 m (Aug. 28, 1972). $\times 1$.
e. *Geranium refractum* Edgew. et Hook. f.
Thudam—Kipuphu, 3400–4500 m (Jun. 26, 1972). $\times 1$.
- Plate 5. a. *Helwingia himalaica* Hook. f. et Thoms.
Ghum, 2300 m (Jul. 7, 1969). $\times 1/2$.
b. A leaf with fruits of the same species.
Palmajua—Batasi, 2200–2100 m (Aug. 8, 1972). \times ca. 1.
c. *Helwingia japonica* (Thunb.) Dietr. var. *japonica*.
Usui Pass, Karuizawa, Japan (Aug. 27, 1971). $\times 1/2$.
d. *Begonia dioica* Hamilt. ex D. Don, ♀.
Palmajua, 2200 m (Aug. 6, 1972). $\times 1/3$.
e. *Passiflora napalensis* Wall.
Dhara Pani—Sanguri Bhanjyang, 1200 m (Jul. 10, 1972). $\times 6/5$.
- Plate 6. a. *Lysionotus atropurpureus* Hara.
Siri Khola—Rimbick, 2100–2200 m (Aug. 5, 1972). $\times 2/3$.
b. *Chirita calva* C. B. Clarke.
Raman—Rimbick, 1900–2400 m (Aug. 5, 1972). $\times 3/4$.

- c. *Platystemma violoides* Wall.
Trisuli Khola, 2000 m (Aug. 22, 1972). $\times 4/5$.
- d. *Cotylanthera paucisquama* C. B. Clarke.
Palmajua, 2200 m (Aug. 7, 1972). $\times 1/3$.
- e. The same at the natural habitat. $\times 2/3$.
- Plate 7. a, b. *Diplomeris hirsuta* Lindl.
Sim Chotala, 900 m (Aug. 20, 1972). $a \times 3/5$, $b \times 1$.
- c. *Cypripedium elegans* Reichb. f.
Topke Gola, 3600 m (Jun. 17, 1972). $\times 1$.
- d. *Gastrodia Dyeriana* King et Pantl.
Palmajua, 2200 m (Aug. 7, 1972). $\times 4/5$.
- e. *Calanthe trulliformis* King et Pantl.
Below Raman, 2400 m (Aug. 4, 1972). $\times 4/5$.
- f. *Anoetochilus lanceolatus* Lindl.
Simkuna, 2200 m (Aug. 10, 1972). $\times 6/5$.
- Plate 8. a. Holotype of *Salix anticecrenata* Kimura, ♀.
Topke Gola, 3800 m (Kanai, Ohashi, K. Iwatsuki, Ohba, Z. Iwatsuki & Shakya тг 727278).
- b. A part of the holotype. $\times 2.7$.
- Plate 9. Micrographs of various small portions of orchid flowers from E. Himalaya. Photo by Miss Keiko Nishikawa, all from the moistened specimen.
- a. *Anoetochilus lanceolatus*. Simkuna (Aug. 10, 1972). One of the coupled callose plates inside the spur. $\times ca. 30$.
- b. *Habenaria latilabris*. Chauke—Dor (Jul. 6, 1972—much hairy individual).
Upper portion of the lateral sepal. $\times ca. 100$.
- c. The same. Portion of the middle part of the same sepal. $\times ca. 100$.
- d. The same. The middle portion of the sepal. Dunche—Singum Gompa (Aug. 22, 1972—less hairy individual). $\times ca. 100$.
- e. *Habenaria goodyeroides*. Sim Chotala—Gram (Aug. 20, 1972). Portion of the lip including the right-hand sinus. $\times ca. 100$.
- f. *Listera pinetorum*. Lamo Pokhari (Jun. 9, 1972). Upper portion of the margin of the lip. $\times ca. 200$.
- g. The same lip at the middle portion. $\times ca. 200$.
- h. The same lip at the lower portion. $\times ca. 200$.
- Plate 10. a. Holotype of *Sedum callianthum* H. Ohba (Stainton 4703 BM).
- b. Holotype of *Sedum nepalicum* H. Ohba (Stainton, Sykes & Williams 2222 BM).
- c. *Sedum discolor* Franch. (Kanai, Hara & Ohba тг 726336).
- d. *Sedum Prainii* R.-Hamet (Polunin, Sykes & Williams 3800 тг).
- Plate 11. *Sedum crenulatum* Hook. f. et Thoms.
- a. Yeumtong, Sikkim (J. D. Hooker in 1849 κ -lectotype of *S. crenulatum* Hook. f. et Thoms.).
- b. Monte Yülingshan, prope Likiang, Yunnan (Handel-Mazzetti 3822 GB-isotype of *S. euryphyllum* Fröd.).
- c. Inukhu Khola, Naulekh Mathi, Nepal (Mc Cosh 376 BM).
- d. Gooring Valley, Tibet (Littledale in 1895 κ -holotype of *S. rotundatum* Hemsley).
- Plate 12. Himalayan *Hedysarum* (1).
- a. Lectotype of *H. astragaloides* Benth. ex Baker (Thomson in 1848 κ).

- b. Isotype of *H. campylocarpon* Ohashi (Polunin 1226 π).
 c. Lectotype of *H. microcalyx* Baker (Falconer 439 κ).
 d, d'. *H. cachemirianum* Benth. ex Baker (d: Polunin 56/566 BM, d': Rao 9552 π).

Plate 13. Himalayan *Hedysarum* (2).

- e. Lectotype of *H. Falconeri* Baker (Falconer 441 κ).
 f. *H. kumaonense* Benth. ex Baker (Stainton, Sykes & Williams 856 π).
 g. Lectotype of *H. laxiflorum* Benth. ex Baker (= *H. alpinum* L. subsp. *laxiflorum* (Benth. ex Baker) Ohashi et Tateishi) (Falconer 440 κ).
 h. Isotype of *H. nepalense* Ohashi var. *subhirtellum* Ohashi (= *H. manaslense* (Kitamura) Ohashi) (Lowndes 1474 π).

Plate 14. Himalayan *Hedysarum* (3).

- i. Holotype of *H. pseudomicrocalyx* Ohashi et Tateishi (Duthie 21252 κ).

Plate 15. Himalayan *Hedysarum* (4).

- j. *H. sikkimense* Benth. ex Baker var. *sikkimense* (Kanai et al. π 720706).
 k. Holotype of *H. sikkimense* Benth. ex Baker var. *megalanthum* Ohashi et Tateishi (Ludlow, Sherriff & Elliot 13160 BM)

Plate 16. *Helwingia japonica* (Thunb.) Dietr. var. *japonica* from Jinmuji, Japan.

- a. Leaves with male flowers. \times ca. 1.
 b. Leaf-margin. \times 3.
 c. Male flowers. \times 3.
 d. A female flower. \times 3.
 e. Pollen grain. \times 700.
 f. Stoma. \times 80.

Plate 17. *Helwingia japonica* (Thunb.) Dietr.

- a. Anhwei: Chiu Hwa Shan (Fan & Li 94 E).
 b. Yunnan: Chienchuan—Mekong Divide (Forrest 21942 E).

Plate 18. a, b. *Helwingia japonica* var. *nanchuanensis* Fang.

- Szechuan: Nanchuan Hsien (Hwang 91 A—isotype).
 c, d. *H. japonica* var. *hypoleuca* Hemsl. ex Rehder.
 Hupeh: Patung (Henry 1706 A—type).
 d. Stomata and papillae. \times 80.

Plate 19. a. *Helwingia japonica* var. *parvifolia* Makino.

- Japan. Prov. Kai: Shimobe (Hisauchi π).
 b. *H. japonica* subsp. *liukiensis* (Hatusima) Hara et Kurosawa.
 Okinawa: Hentona—Yonahadake (Y. Kimura & Hurusawa π).
 c. *H. japonica* subsp. *formosana* (Kaneh. et Sasaki) Hara et Kurosawa.
 Formosa: Tawushan (Namba et al. 382 π).

Plate 20. *Helwingia himalaica* Hook. f. et Thoms.

- a. Sikkim (Hook. f. κ -type).
 b. Tonkin: Chapa (Pételot 5679 A).
 c. A flowering branch. Darjeeling: Ghum (Apr. 29, 1970). \times 3/5.
 d. Stomata. Darjeeling: Ghum (Apr. 29, 1970), cultivated at Karuizawa.
 \times 80.

Plate 21. a. *Helwingia himalaica* var. *parvifolia* Li.

- Yunnan: Londjire (Rock 8871 A—type).
 b. *H. chinensis* f. *megaphylla* Fang.
 Kiangsi: Hong Shan (Gressitt 1514 A—isotype).

- Plate 22. *Helwingia chinensis* Batalin.
Hupeh: S. Patung (Henry 6719B, ♂ fl. κ). b, c. × 1.
- Plate 23. *Helwingia chinensis* Batalin.
a. Szechuan (Henry 6719A CAL-isosynotype of *H. chinensis*).
a'. A leaf of the same. × 1.
b. N. Burma: Ngawchang Valley (K.-Ward 63 A-type of *H. himalaica* var. *stenophylla*).
- Plate 24. *Helwingia chinensis* Batalin.
a. Hupeh: Hsing-shan Hsien (E. H. Wilson 172 E).
b. Hupeh: Patung (Chow 133 E).
- Plate 25. *Helwingia chinensis* var. *crenata* (Lingelsh.) Fang.
a. Szechuan: Kwan Hsien (Limpricht 1286A A-photo of type).
b. Szechuan: Kuan Hsien (S. S. Chien 5682 BM).
- Plate 26. *Helwingia chinensis* Batalin.
a. A leaf of f. *megaphylla* Fang. Kiangsi: Hong Shan (Gressitt 1514 E-isotype). × 1.
b. Leaves of f. *chinensis*. N. Burma: Maikha—Salwin Divide (Forrest 29726 E). × 1.
- Plate 27. *Helwingia omeiensis* (Fang) Hara et Kurosawa.
a. Szechuan: Mt. Omei (Fang 12621 A-isotype).
b. The same locality (Chiao & Fang 405 A).
- Plate 28. *Helwingia omeiensis* var. *oblanceolata* (Chien) Hara et Kurosawa.
a. Kweichow: Tungtze (Tsiang 4966 E-isotype).
b. Kweichow: Liang Fang Yah (Steward, Chao & Cheo 23 BM).
- Plate 29. Leaves of *Helwingia omeiensis* (a, b) and its var. *oblanceolata* (c-e). × 1.
a. Szechuan: Mt. Omei (Fang 12621 A-isotype).
b. The same locality (E. H. Wilson 4942 BM).
c. Kweichow: Tungtze (Tsiang 4966 E-isotype).
d. Yunnan: Lunguan (Yü 20017 E).
e. Kweichow: Tungtze (Tsiang 4966 κ-isotype).
- Plate 30. Scanning electron micrographs of the undersurface of leaf.
a. *Helwingia japonica*. × 710.
b. The same. × 2100.
c. *H. japonica* subsp. *liukiuensis*. × 710.
d. *H. himalaica*. × 710.
e. The same. × 2100.
- Plate 31. Scanning electron micrographs of the undersurface of leaf.
a. *Helwingia japonica* var. *hypoleuca* Hemsl. ex Rehd. (E. H. Wilson 132, cult. at Roy. Bot. Gard., Edinburgh). × 710.
b. The same. × 2100.
c. *H. japonica* var. *nanchuanensis* Fang (Hwang 91 A-isotype). × 710.
d. The same. × 2100.
- Plate 32. Scanning electron micrographs of the undersurface of leaf.
Helwingia omeiensis (Fang) Hara et Kurosawa from Mt. Omei.
a, b. (Chow 9934 A), c, d. (Chow 11683 A).
a, c. × 710. b, d. × 2100.
- Plate 33. Micrographs of somatic chromosomes of *Helwingia*. × 1900.
a. *H. himalaica* from Ghum, Darjeeling.

- b. *H. japonica* var. *hypoleuca* from Roy. Bot. Gard., Edinburgh.
- c. *H. japonica* var. *parvifolia* from Kawazu, Prov. Izu.
- d. The same from Mt. Kanmuri, Prov. Satsuma.
- e. *H. japonica* subsp. *formosana* from Nankotaisan, Formosa.
- f. *H. japonica* subsp. *liukiuensis* from Mt. Katsuudake, Ryukyu.
- g. *H. japonica* var. *parvifolia* from Mt. Tara, Prov. Hizen.



a. *Bistorta amplexicaulis* var. *pendula*

b. *Clematis alternata*



c. *Salix anticecrenata* mstr. *monadelpha*





a. *Meconopsis horridula*



b. *Meconopsis discigera*

Plate 3



c. *Sedum bupleuroides*



d. *Sedum linearifolium*



a. *Gueldenstaedtia himalaica*



b. *Hedysarum sikkimense*



c. *Geranium Lambertii*

d. *Geranium procurrens*



e. *Geranium refractum*



a, b. *Helwingia himalaica*



c. *Helwingia japonica*

d. *Begonia dioica*



e. *Passiflora nepalensis*





a. *Lysionotus atropurpureus*



b. *Chirita calva*

Plate 6

d, e. *Cotylanthera paucisquama*



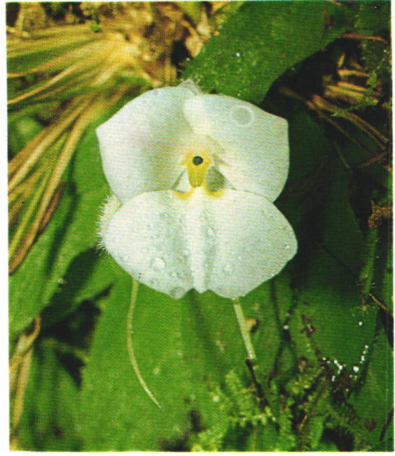
d

c. *Platystemma violoides*



e





a, b. *Diplomeris hirsuta*



c. *Cypripedium elegans*

d. *Gastrodia Dyeriana*



e. *Calanthe trulliformis*

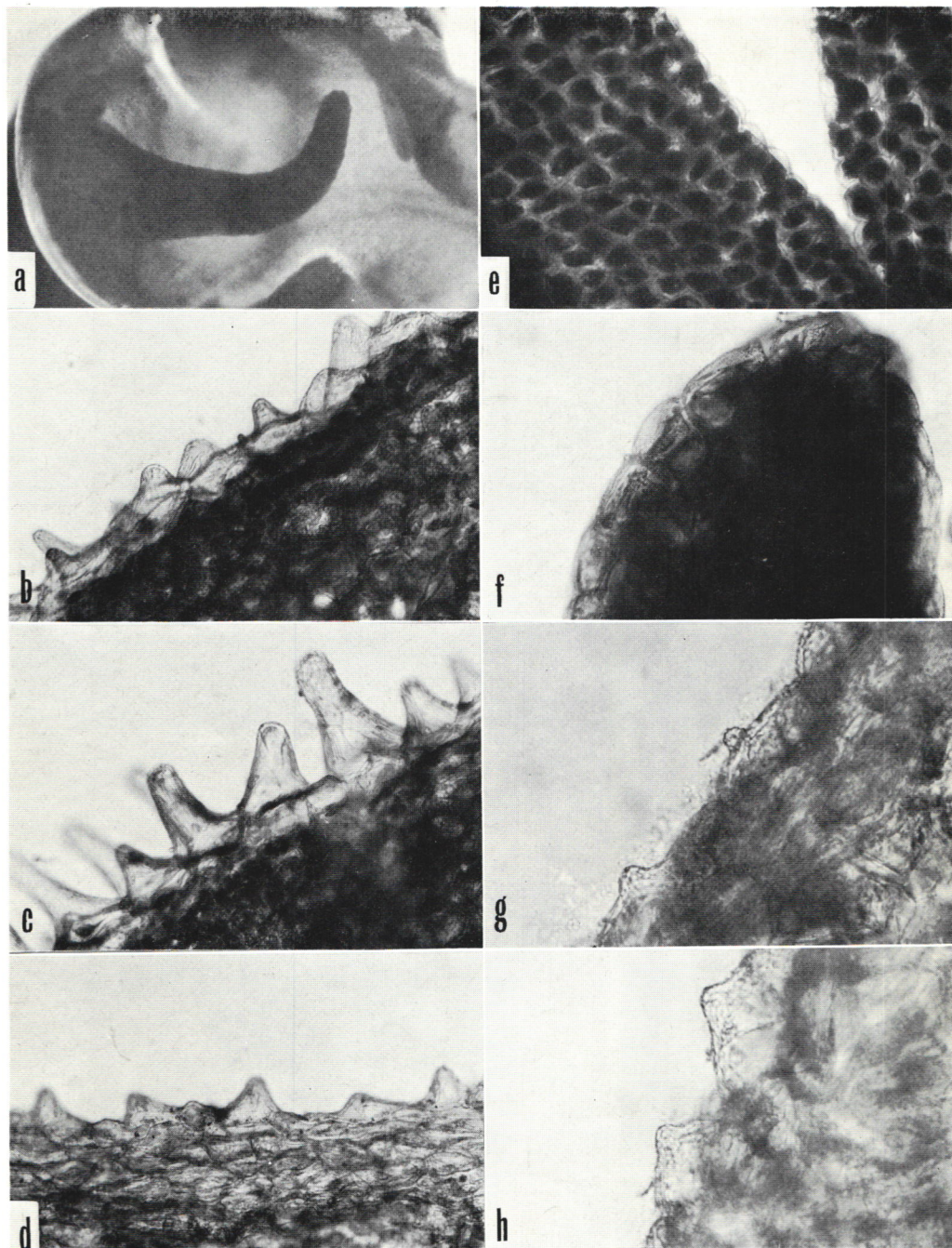


f. *Anoectochilus lanceolatus*





a, b. *Salix anticecrenata* ♀



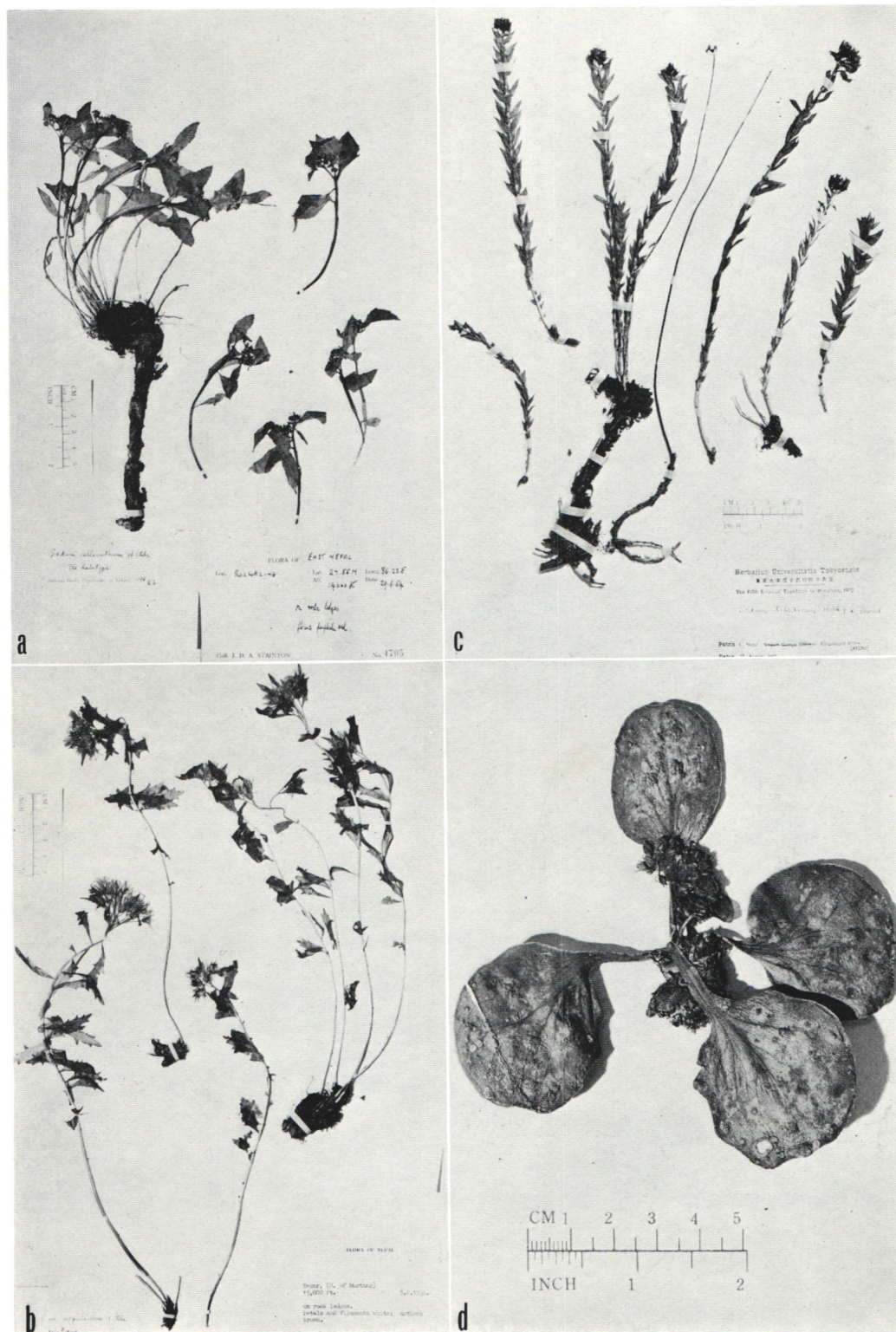
Micrographs of various small portions of orchid flowers from E. Himalaya

a. *Anoectochilus lanceolatus*

e. *Habenaria goodyeroides*

b - d. *Habenaria latilabris*

f - h. *Listera pinetorum*



a. *Sedum callianthum*
 c. *Sedum discolor*

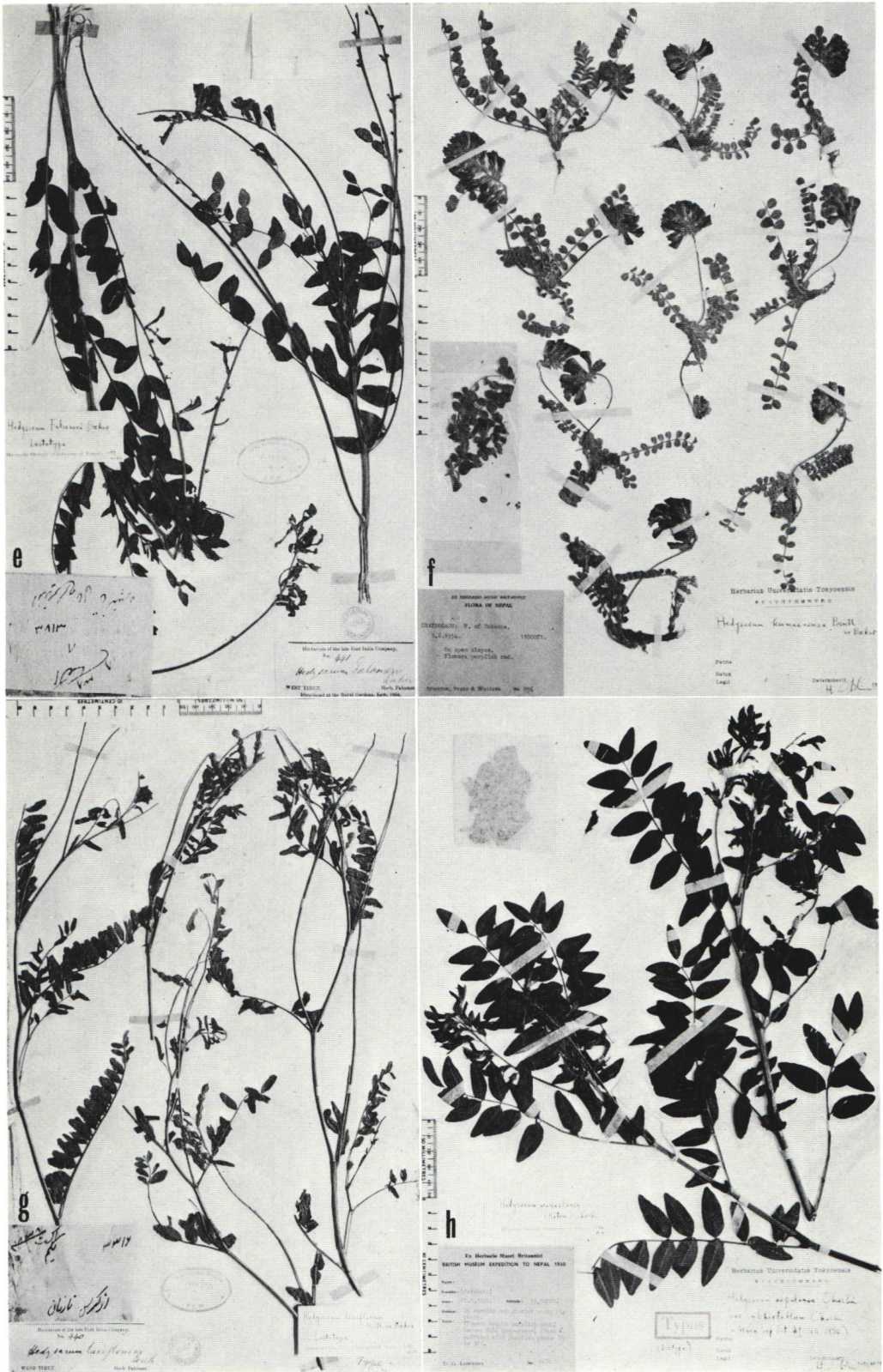
b. *Sedum nepalicum*
 d. *Sedum Prainii*



a - d. *Sedum crenulatum*



Himalayan *Hedysarum* (1) a. *H. astragaloides* b. *H. campylocarpon*
 c. *H. microcalyx* d, d'. *H. cachemirianum*



Himalayan *Hedysarum* (2)

e. *H. Falconeri*

f. *H. kumaonense*

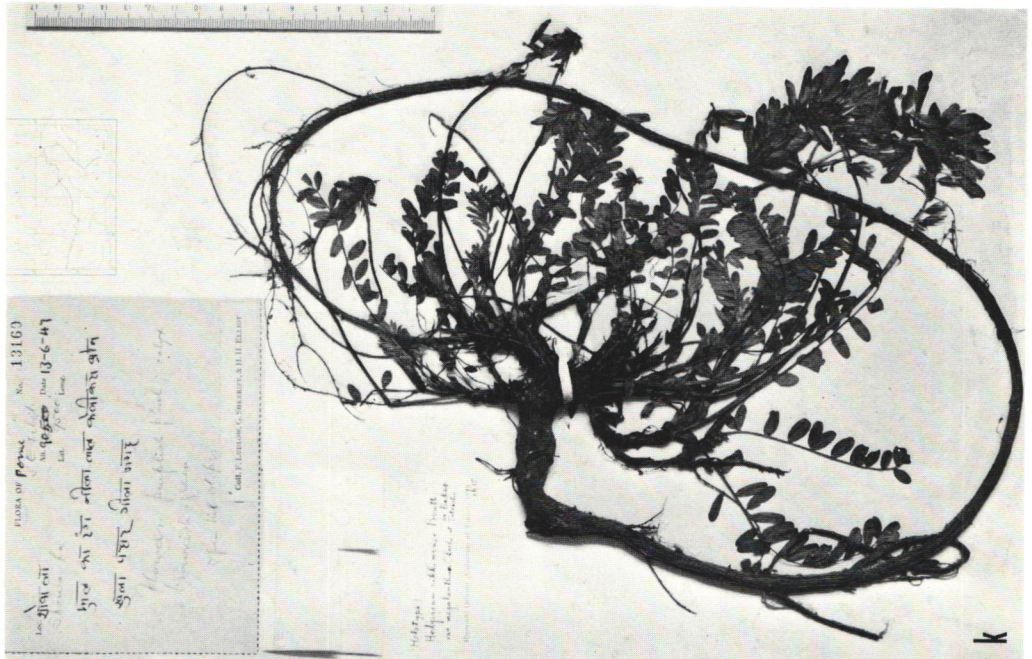
g. *H. alpinum* subsp. *laxiflorum*

h. *H. manslense*



Himalayan *Hedysarum* (3)

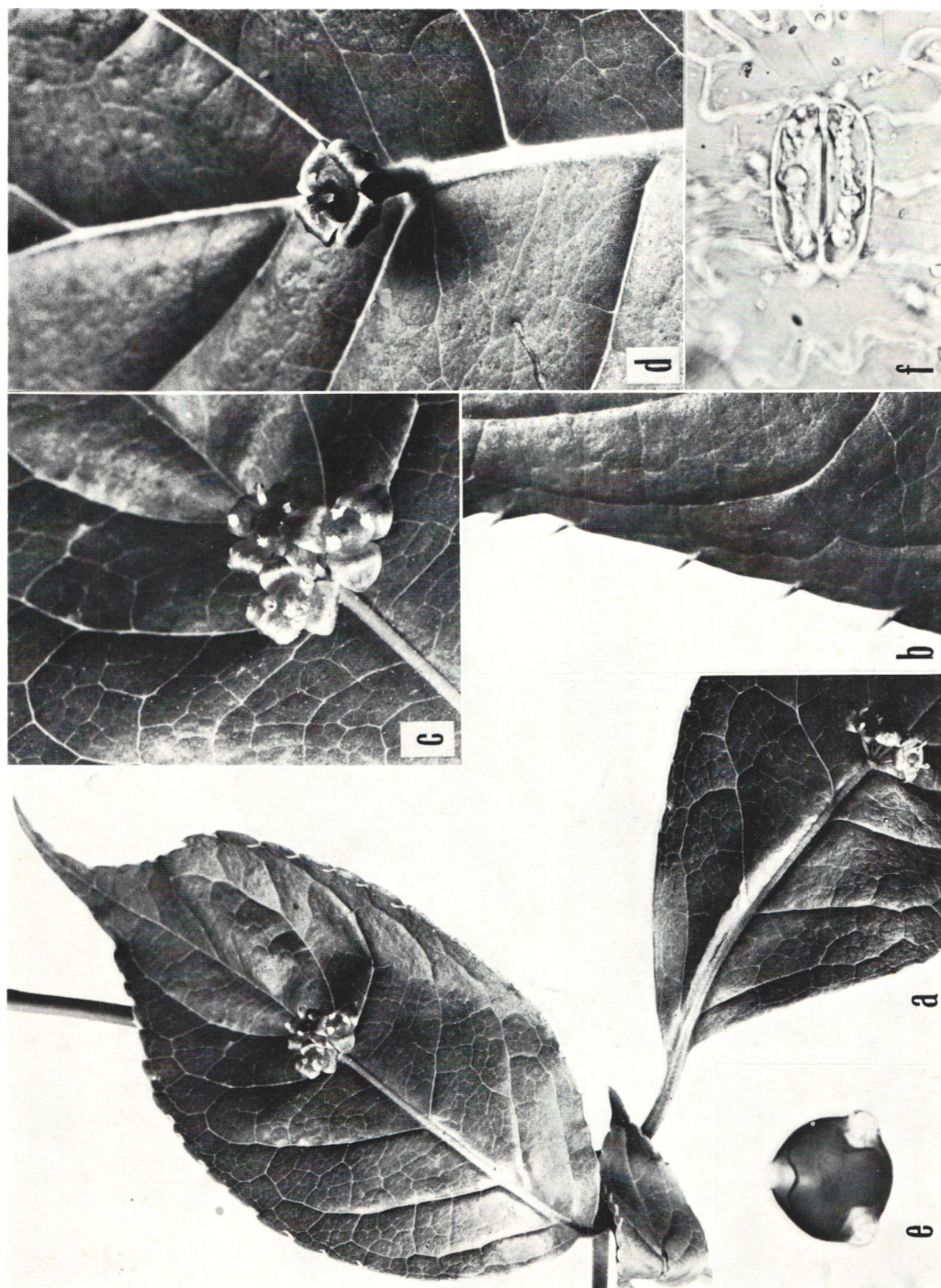
i. *H. pseudomicrocalyx*



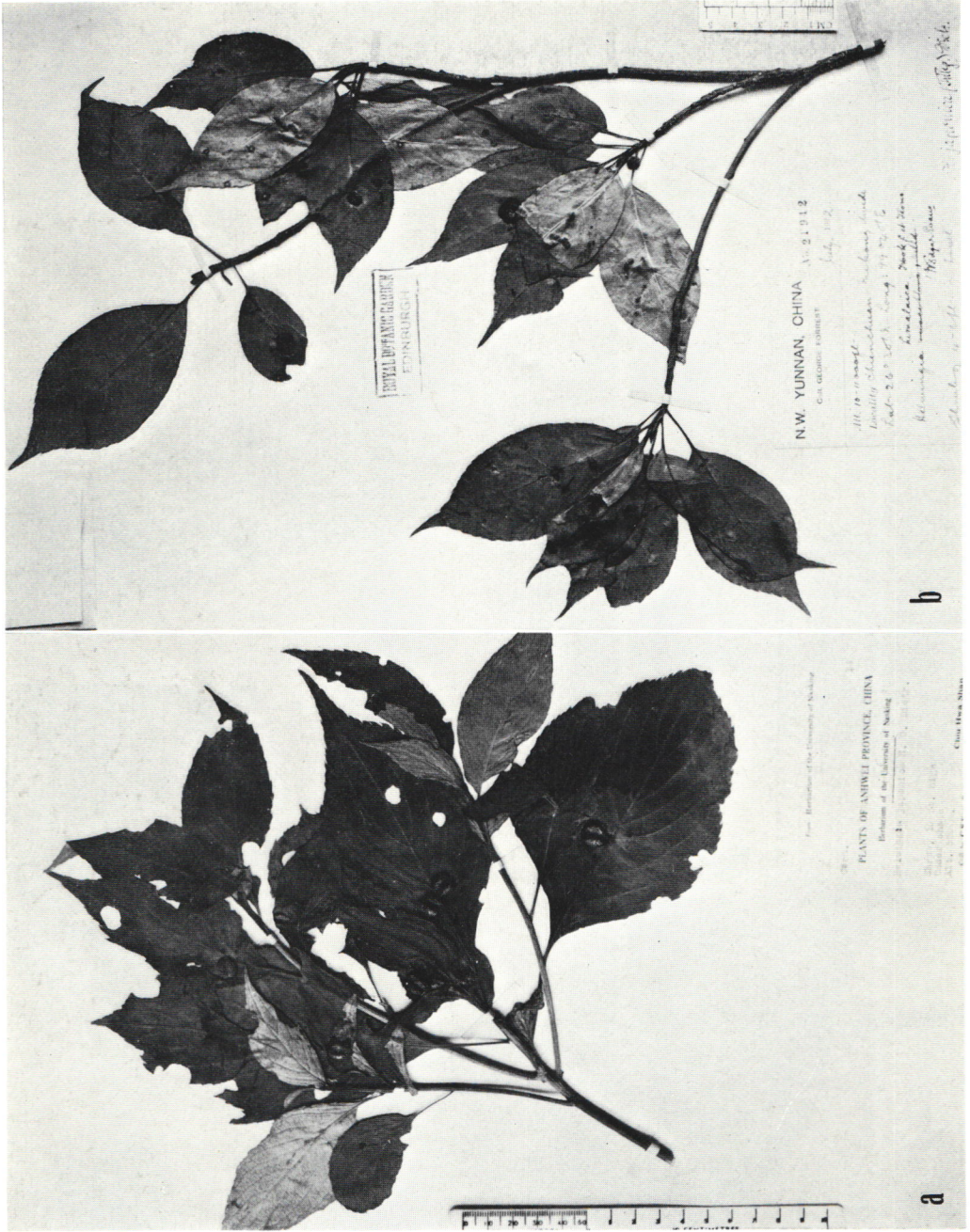
Himalayan *Hedysarum* (4)

j. *H. sikkimense* var. *sikkimense*

k. *H. sikkimense* var. *megalanthum*



a - f. *Helwingia japonica*



a, b. *Helwingia japonica* from China



a, b. *Helwingia japonica* var. *nanchuanensis*

c, d. *H. japonica* var. *hypoleuca*



a. *Helwingia japonica* var. *parvifolia*
c. *H. japonica* subsp. *formosana*

b. *H. japonica* subsp. *liukiensis*



a - d. *Helwingia himalaica*



a. *Helwingia himalaica* var. *parvifolia*

b. *H. chinensis* f. *megaphylla*



a - c. *Helwingia chinensis*



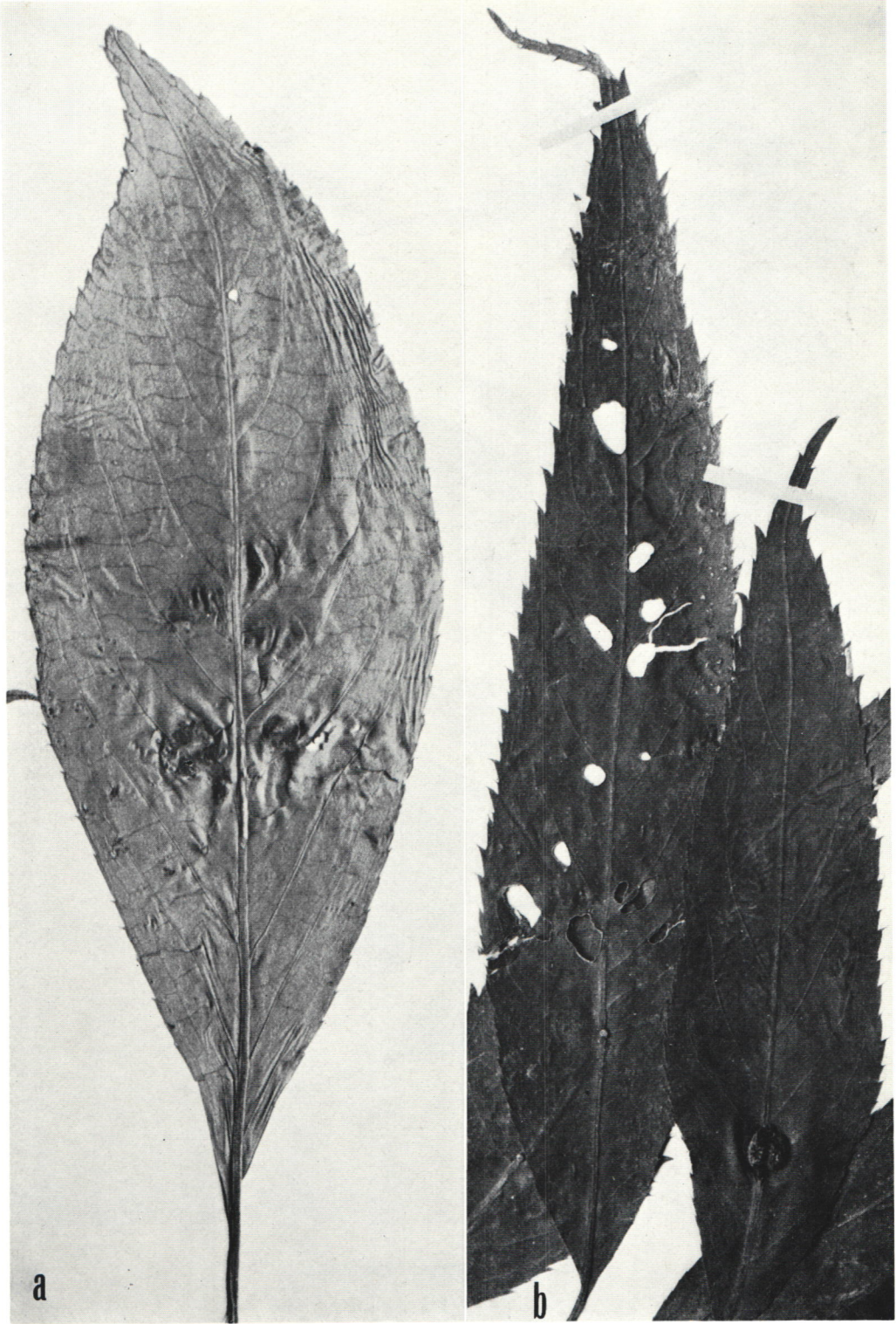
a, a' & b. *Helwingia chinensis*



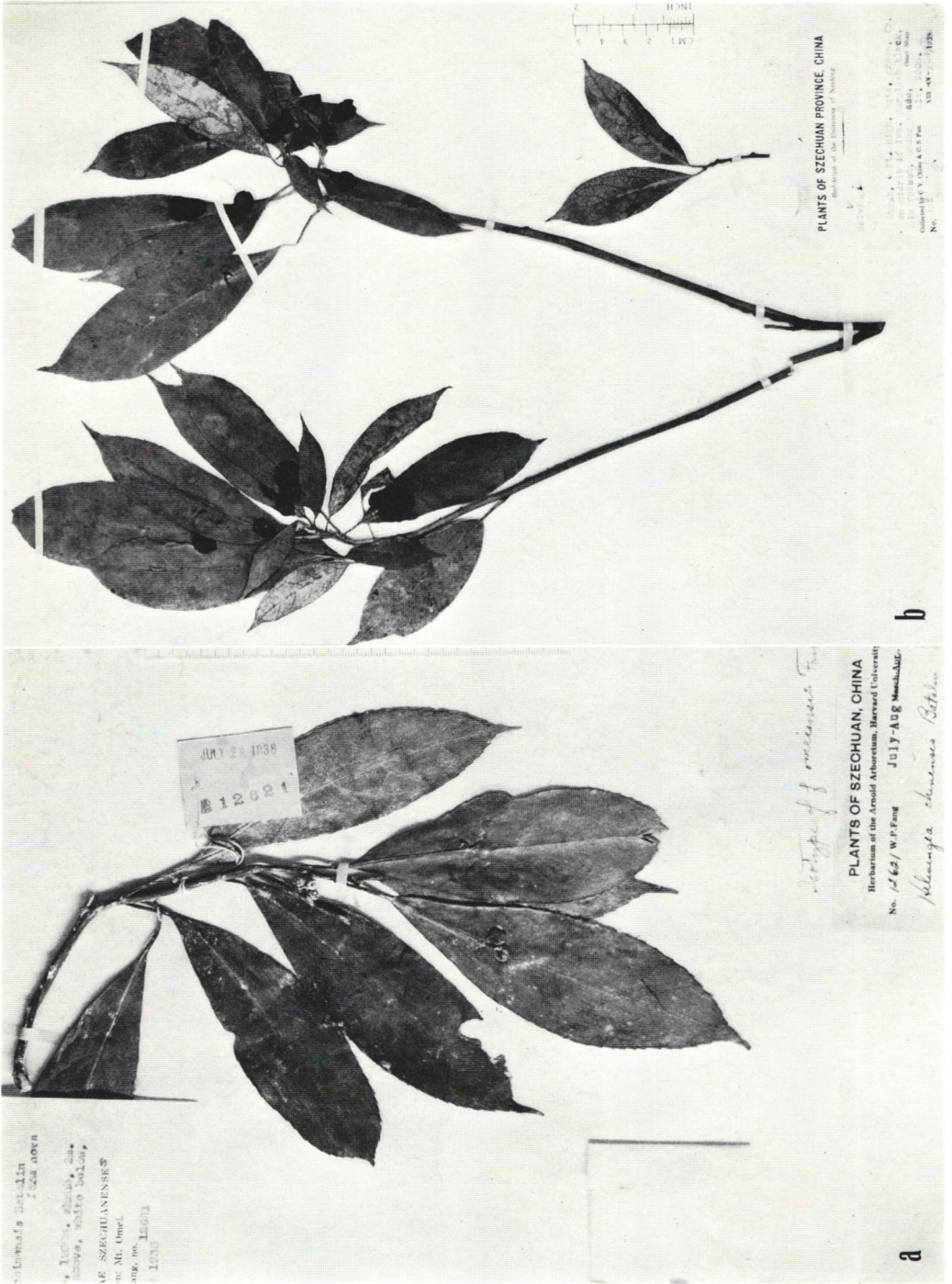
a, b. *Helwingia chinensis*



a, b. *Helwingia chinensis* var. *crenata*



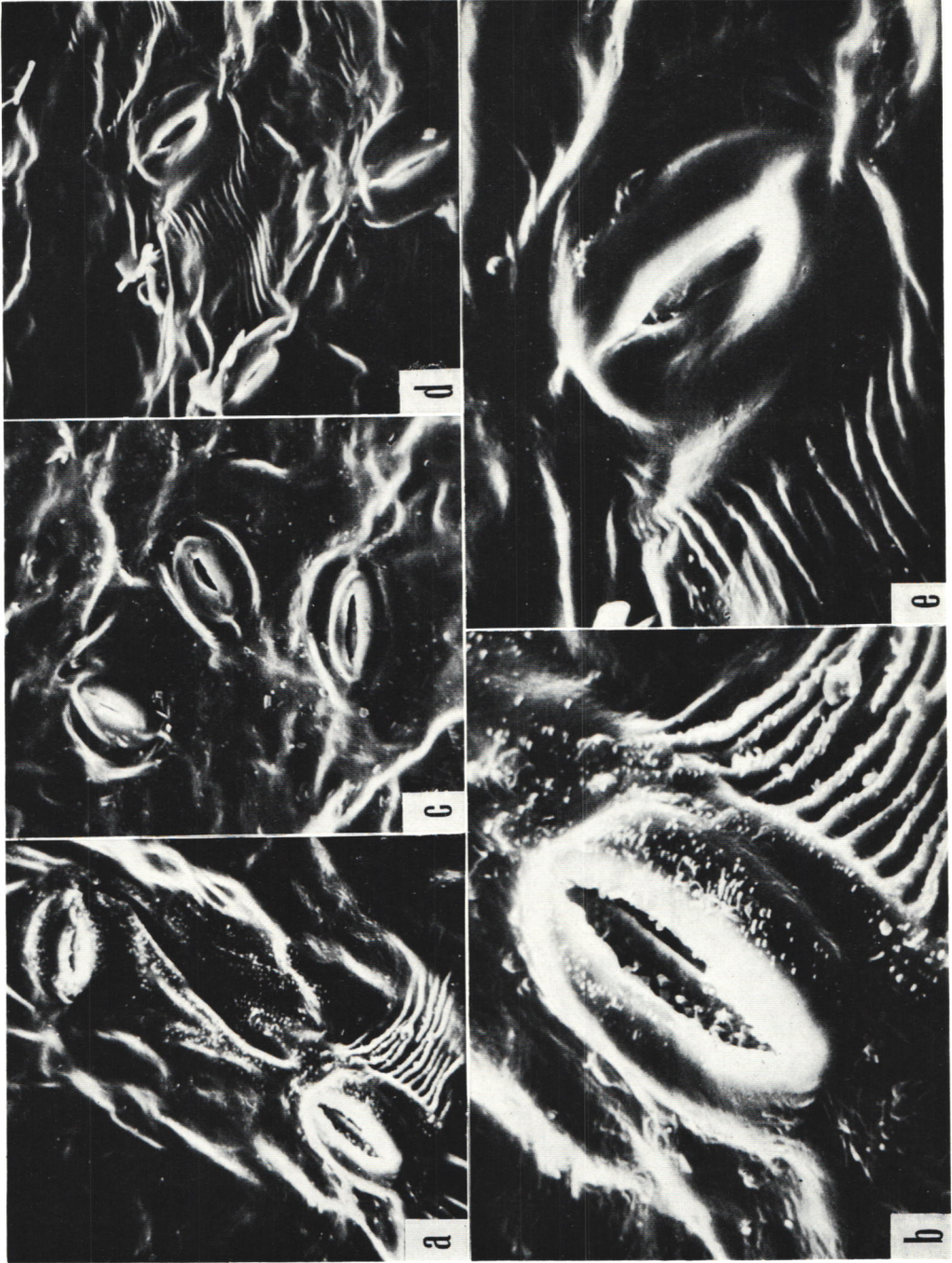
a, b. *Helwingia chinensis*



a, b. *Helwingia omeiensis*



a, b. *Helwingia omeiensis* var. *omeiensis*
c - e. *H. omeiensis* var. *oblanceolata*



Scanning electron micrographs of the undersurface of leaf

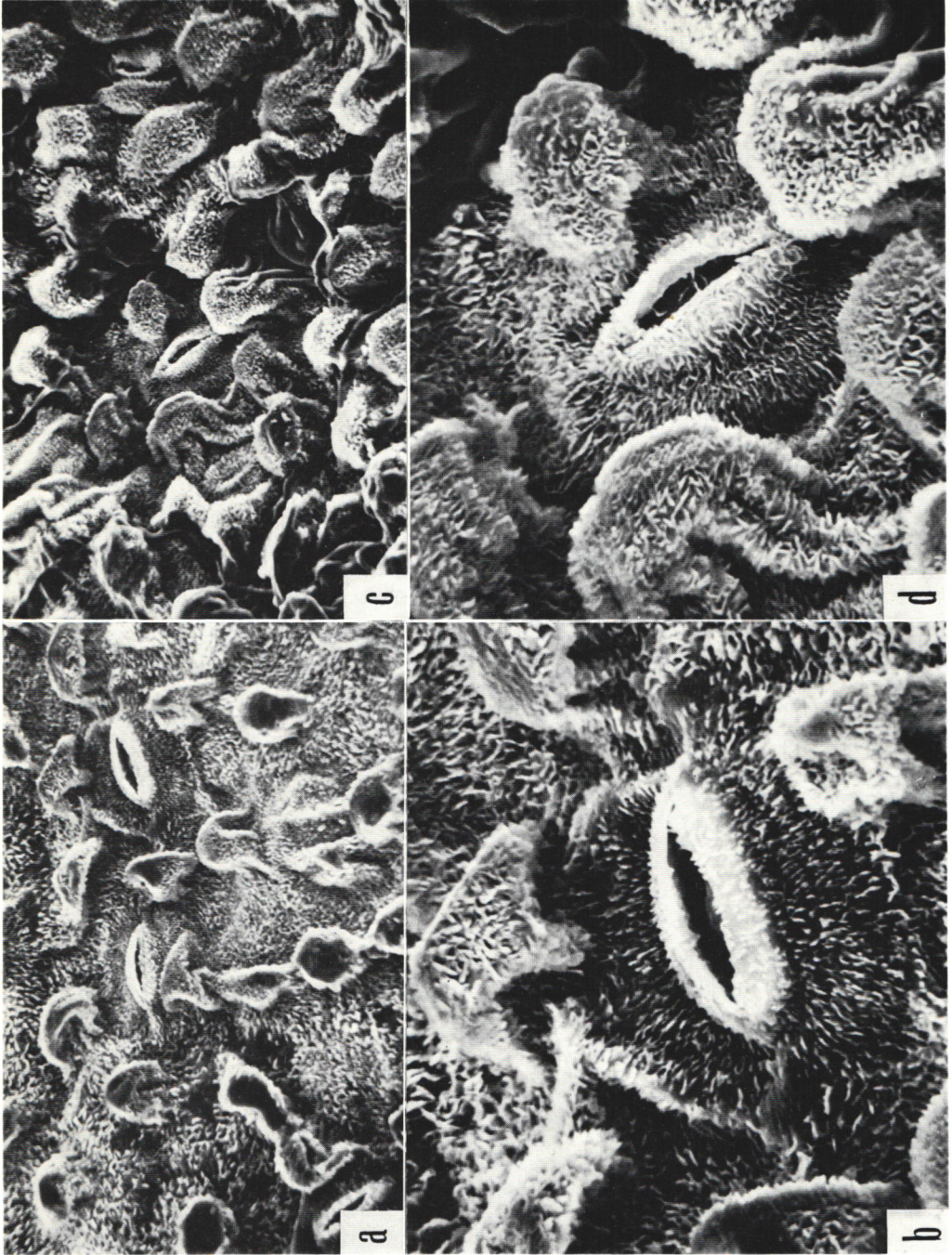
a. *Helwingia japonica* × 710

c. *Helwingia japonica* subsp. *liukuensis* × 710

e. The same × 2100

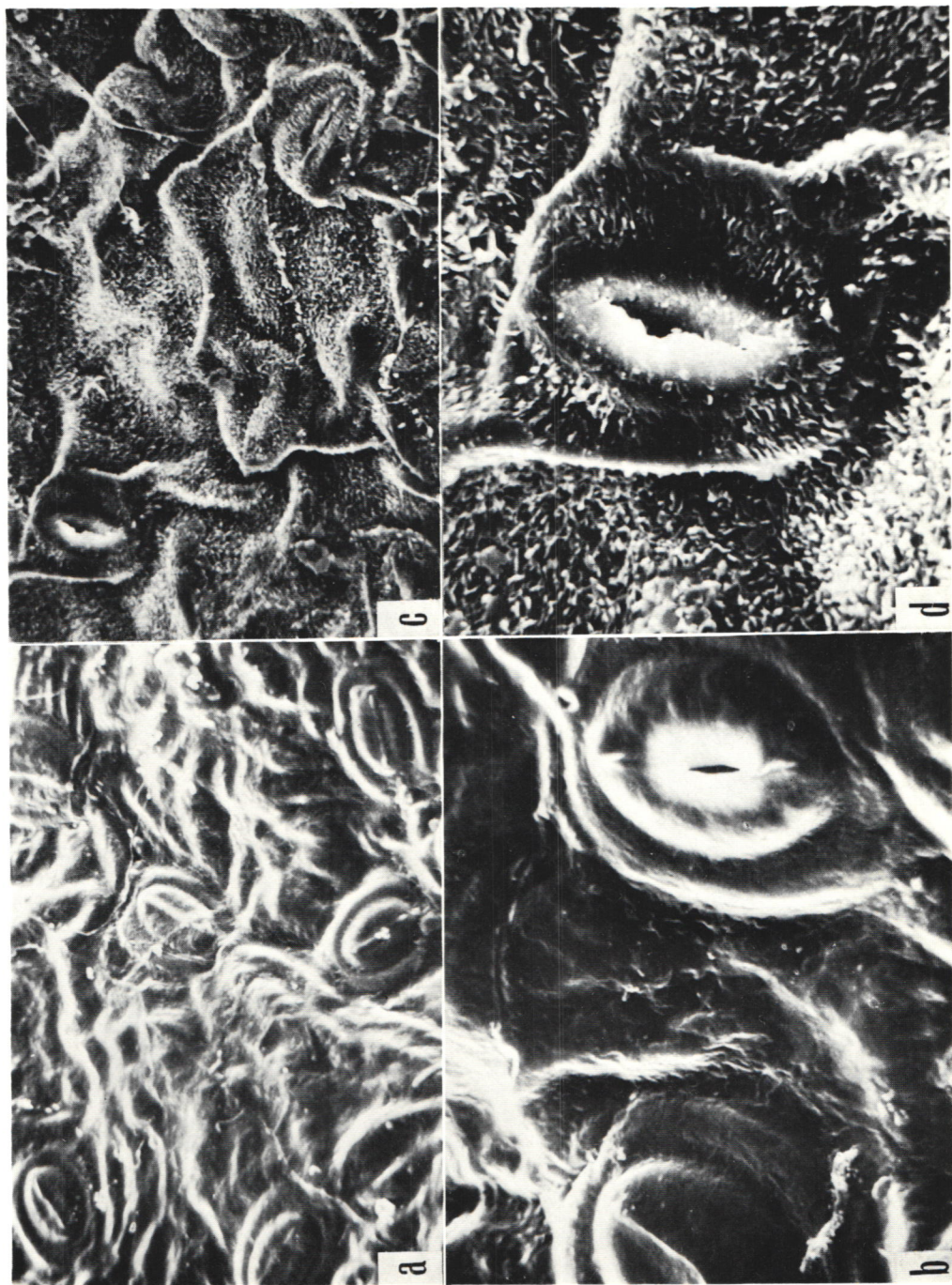
b. The same × 2100

d. *Helwingia himalaica* × 710

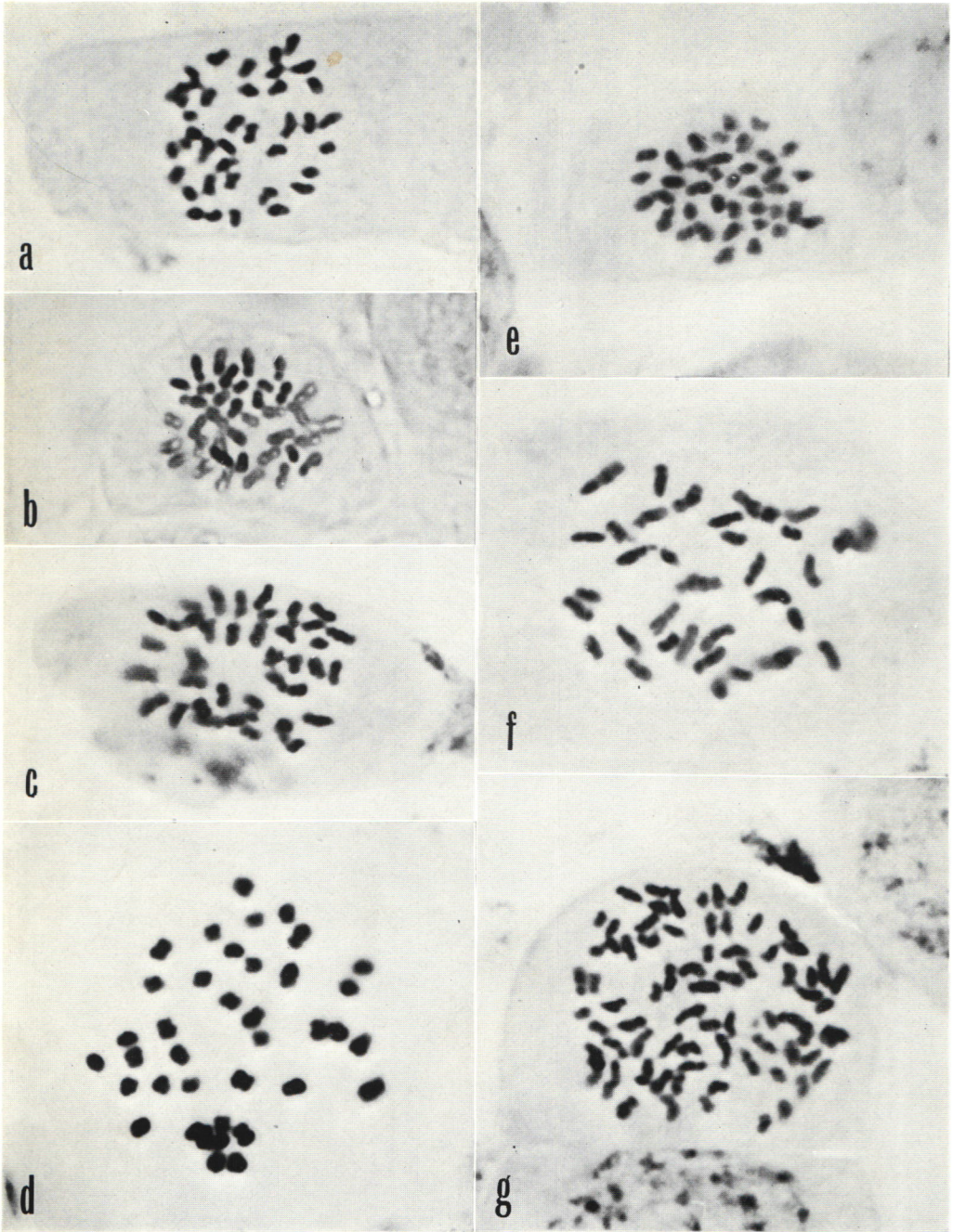


Scanning electron micrographs of the undersurface of leaf

- | | |
|--|--------------------|
| a. <i>Helwingia japonica</i> var. <i>hypoleuca</i> x 710 | b. The same x 2100 |
| c. <i>Helwingia japonica</i> var. <i>nanchuanensis</i> x 710 | d. The same x 2100 |



Scanning electron micrographs of the undersurface of leaf
Helwingia omeiensis a, c. x 710 b, d. x 2100



Micrographs of somatic chromosomes of *Helwingia* x 1900

- | | |
|---|---|
| a. <i>H. himalaica</i> | b. <i>H. japonica</i> var. <i>hypoleuca</i> |
| c, d. <i>H. japonica</i> var. <i>parvifolia</i> | e. <i>H. japonica</i> subsp. <i>formosana</i> |
| f. <i>H. japonica</i> subsp. <i>liukuensis</i> | g. <i>H. japonica</i> var. <i>parvifolia</i> |