

Seeds of Japanese Rubus

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Seeds of Japanese *Rubus*

I. Morphology

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里見信生・鳴橋直弘：日本産キイチゴ属の種子 1. 形態

In his paper "On the Food Habits of Japanese Birds", IKEDA (1956) reported that *Ixos amaurotis amaurotis* (TEMMINCK) eat the seeds of *Rubus buergeri*. The senior writer, SATOMI, has repeatedly observed that the birds eat the seeds of *Rubus* when he conducted investigations on the diet of the birds. RIDLEY (1930) wrote "*Rubi* are extremely popular with birds, and I have a list of 43 birds known to feed on them, but these are only of the north temperate zone, as no observations have been made on the kinds of birds which eat them in tropical or southern countries."

As the seeds of *Rubus* are very hard, they are expected to remain as fossils. DOROFEEV (1963) described several species of *Rubus* from the Tertiary floras of Western Siberia. In Japan the seeds of *Rubus* are reported from the late Cenozoic flora by KOKAWA (1966). It is expected that more fossils will be found in future throughout the world including Japan.

Writers have felt the necessity of the morphological investigation on the seeds of modern Japanese *Rubus*, in order to contribute to the investigators in such fields, as ornithology or paleontology. Recently "The Illustrations of Fruits and Seeds of Japan" was published by OKADA (1964) including two illustrations of the seeds of *Rubus*. As the writers could obtain the fresh seeds of the most species of Japanese *Rubus*, the seeds will be shown here with illustrations and descriptions. For some species the seeds, which were impossible to collect in fresh condition, were obtained from the dried specimens in the Herbarium of Kyoto University (KYO), Herbarium University of Tokyo (TI), and Herbarium of Kanazawa University (KANA). The seeds of the hybrid *Rubus* are omitted in this paper.

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for his kindness to read the manuscript.

Result

A fruit of *Rubus* is an aggregation of drupelets which develop independently. Each drupelet which is similar to those in other drupaceous fruits consists of two part, pulpy part and stony one. The matured ovary wall, the pericarp, is differentiated into histologically distinct layers: exocarp, mesocarp, and endocarp. According to FARMER (1889) and REEVE (1953a, 1953b), the stony wall of the seeds of *Rubus* is the endocarp originated from the pericarp, and "lignification" sets in the cells of the endocarp resulting in the conversion of the entire tissue into the well-known hard shell. Markings of a pitted character may be detected in these lignified fibers.

The writers applied here the morphological terms generally used in palynology (such as muri, lumina, and vallae) and they have followed in main the terminology of FÆRRI and IVERSEN (1964).

Muri (sing. murus, abbr. mur) : walls of reticulum mesh

Lumina (sing. lumen, abbr. lum) : holes of a reticulum

Vallae (sing. valla, abbr. val) : ridges in striate and regulate sculpturing types

The seeds of *Rubus* are distinguished into four Types: *R. chamaemorus* type, *R. nesiotetes* type, *R. buergeri* type, and *R. idaeus* type.

Key to the types

- | | | |
|--|-------|----------------------------|
| 1 Seed smooth or nearly so | | <i>R. chamaemorus</i> type |
| 1 Seed with reticulate or striate | | 2 |
| 2 Seed crescent shaped | | <i>R. nesiotetes</i> type |
| 2 Seed reniform or nearly so | | 3 |
| 3 Val (mur) at back of seed rising | | <i>R. buergeri</i> type |
| 3 Val (mur) at back of seed not rising | | <i>R. idaeus</i> type |

R. CHAMAEMORUS TYPE Figs. 1-4.

Diagnosis: reniform or nearly so in side view, smooth, rarely feebly striate or feebly reticulate; ovate to narrowly ovate in lower view; elliptic, margin entire, in cutting face.

Species observed: *R. chamaemorus*, *R. pectinellus*, *R. pedatus*, *R. pseudojaponicus*.

Note: Three species except for *R. pectinellus* occur in northern part of Japan as well as in subalpine zone of middle Honshu. The size of the seed of this type is larger than the other three types with a few exceptions. Taxonomically the species having the

seeds of this type are ranging in subgen. *Chamaemorus*, subgen. *Chamaebatus*, subgen. *Cylactis*, and subgen. *Dalibarda*. KOIDZUMI (1913) places *R. ikenoensis* in subgen. *Cylactis* as in the case of *R. pseudojaponicus*. The seed grains of *R. ikenoensis* is *R. idaeus* type and different from those of *R. pseudojaponicus*. From seed morphology we can not support the system by KOIDZUMI.

R. NESIOTES TYPE Fig. 5.

Diagnosis : lunate in side view, striate, but inner few reticulate, val and mur thick; narrowly elliptic in lower view; elliptic, margin undulate, in cutting face.

Species observed: *R. nesiotes*.

Note: *R. nesiotes* is a member of sect. *Sozostyli* in subgen. *Malachobatus* and occurs only in Ryukyu.

R. BUERGERI TYPE Figs. 6-9.

Diagnosis: deltoid reniform to nearly reniform in side view, outer striate, inner reticulate, val (mur) at back remarkably rising; elliptic or nearly so in lower view; broadly elliptic, margin undulate, in cutting face, keel lower than val.

Species observed: *R. buergeri*, *R. hakonensis*, *R. lambertianus*, *R. sieboldii*.

Note: Species with the seeds of this type belong to two sections, *Acuminati* and *Maluccani*, in subgen. *Malachobatus*.

R. IDAEUS TYPE Figs. 10-35.

Diagnosis: nearly reniform to nearly ovate in side view, reticulate; elliptic or nearly so in lower view; nearly circular to elliptic, margin undulate to crenate, in cutting face.

Species observed: *R. chingii*, *R. crataegifolius*, *R. corchorifolius*, *R. croceacanthus*, *R. grayanus*, *R. hirsutus*, *R. idaeus* var. *aculeatissimus*, *R. idaeus* var. *yabei*, *R. ikenoensis*, *R. illecebrosus*, *R. kisoensis*, *R. koehneanus*, *R. mesogaeus*, *R. microphyllus*, *R. minusculus*, *R. oldhamii*, *R. palmatus*, *R. parvifolius*, *R. peltatus*, *R. phoenicolasius*, *R. pseudoacer*, *R. ribesoides*, *R. sumatranus*, *R. trifidus*, *R. vernus*, *R. yoshinoi*.

Note: All the species having the seeds of this type belong to subgen. *Idaeobatus*. Among the seeds of this type, those of *R. vernus*, sect. *Spectabiles*, known in subalpine zone of Japan Sea Region, is the largest, and those of sect. *Rosifolii*, in southern part of Japan, represent the smallest size.

According to FOCKE (1910) and KOIDZUMI (1913), *R. trifidus* and *R. ribesoides* are included in subgen. *Anoplobatus*. However, the seeds of these two species are morp-

hological identical with *R. idaeus* type. Seed morphology of *R. odoratus*, subgen. *Anoplobatus*, is distinct in hilum position: that of *R. trifidus* and *R. ribesoides* are lateral (subbasal) but that of *R. odoratus* is basal. We could not find this basal type in any of the Japanese *Rubi*. As the hilum position is a distinct feature, we suggest the necessity for further investigation on subgen. *Anoplobatus*.

Illustration and description

All well-known species were illustrated in side view (right upper), in lower view (right lower), and in transversely cut face (left). The illustrations were made in the same scale for each species, but were different according to the species.

Fig. 1: *R. chamaemorus* LINN. Yachi-ichigo (Horomui-ichigo)

- (A) nearly reniform (3.4*-2.1**); smooth, partly striate
- (B) ovate
- (C) broadly elliptic; margin entire

The seeds from Sakhalin are larger than the others.

Sp. ex. Pref. Hokkaido, Asajino (ill.)

Pref. Hokkaido, Sarobetsu

Sakhalin, Amiba (KYO)

Fig. 2: *R. pectinellus* MAXIM. Kobano-fuyu-ichigo (Maruba-fuyu-ichigo)

- (A) deltoid reniform (2.9-1.9); apparently smooth, but wholly feebly reticulate, lum very shallow, mur very low
- (B) ovate
- (C) elliptic; margin almost entire

This is a little different in form and the sculpture of surface from the other species that belong to *R. chamaemorus* type.

Sp. ex. Pref. Shiga, Mt. Horai-san

cult. in Kyoto from Pref. Shizuoka, Jorennotaki (ill.)

Fig. 3: *R. pseudojaponicus* KOIDZ. Hime-goyō-ichigo (Togenashi-goyō-ichigo)

- (A) reniform (2.4-1.5); apparently smooth, but wholly very feebly reticulate
- (B) narrowly ovate
- (C) elliptic; margin entire

Sp. ex. Pref. Hokkaido, Mt. Yubari-dake (ill.)

Pref. Nagano, Mt. Yatsugatake

Fig. 4: *R. pedatus* SMITH Kogane-ichigo

- (A) nearly ovate (3.6-2.0); smooth, partly feebly large reticulate; keel slightly rising
- (B) narrowly ovate

* average length (mm) of specimens illustrated

** average width (maxim diameter) (mm) of specimens illustrated

(C) elliptic ; margin entire

This seed-form is peculiar among Japanese *Rubi*.

Sp. ex. Pref. Hokkaido, Mt. Rausu-dake (ill.)

Pref. Hokkaido, Mt. Yubari-dake

Pref. Nagano, Mt. Yatsugatake

Pref. Toyama, Mt. Asahi-dake

Fig. 5 : *R. nesiotis* FOCKE Kuwanoha-ichigo

(A) lunate (crescentshaped) (2.7-1.1) ; striate, but inner few reticulate ; val and mur thick

(B) narrowly elliptic

(C) elliptic ; margin undulate

This seed is similar to that of *R. swinhoei* from Formosa.

Sp. ex. Pref. Okinawa, Nakagami (KYO) (ill.)

Fig. 6 : *R. buergeri* MIQ. Fuyu-ichigo

(A) deltoid reniform (2.2-1.6) ; outer striate, inner reticulate ; val at back remarkably rising

(B) elliptic

(C) broadly elliptic ; keel lower than val ; margin irregularly undulate

Sp. ex. Pref. Kyoto, Mt. Daimonji-yama (ill.)

Pref. Kyoto, Kochi-dani

Pref. Kochi, Nishidera

Pref. Kagoshima, Kanoya (KYO)

Pref. Kagoshima, Isl. Yakushima

Fig. 7 : *R. hakonensis* FR. et SAV. Miyama-fuyu-ichigo

(A) deltoid reniform (2.2-1.6) ; striate, inner few reticulate ; val at back remarkably rising

(B) elliptic

(C) broadly elliptic ; keel lower than val ; margin irregularly undulate

The seeds from Mayu-yama have more conspicuous val than the others, especially comparing with those from Kochi-dani.

Sp. ex. Pref. Kyoto, Kochi-dani

Pref. Shimane, Mitoya-cho (ill.)

Pref. Kumamoto, Itsuki-mura (KYO)

cult. in Kyoto from Pref. Nagasaki, Mt. Mayu-yama

Fig. 8 : *R. lambertianus* SERINGE Shimabara-ichigo

(A) nearly reniform (1.8-1.2) ; striate, but rarely inner reticulate ; val at back and keel slightly rising

(B) oblong elliptic

(C) elliptic ; margin undulate

Though FOCKE (1910) considered *R. lambertianus* and *R. hakonensis* conspecific, it is hardly supported by the morphology of seed.

Sp. ex. Pref. Nagasaki, Nishiariie (KYO) (ill.)

Pref. Nagasaki, Mt. Mayu-yama (KYO)

Pref. Kumamoto, Isshochi (KYO)

Fig. 9 : *R. sieboldii* BLUME hōroku-ichigo

- (A) deltoid reniform (2.0-1.2) ; reticulate, lum small and shallow, mur at back rising
- (B) oblong
- (C) broadly elliptic ; margin undulate

Three specimens Kagoshima are the same size (1.8-1.0) and are smaller than those of Okinawa.

Sp. ex. Pref. Kagoshima, Yamakawa-ko

Pref. Kagoshima, Isl. Yakushima, Kosugidani

Pref. Kagoshima, Isl. Yakushima, Onoaida

Pref. Okinawa, Kunigami (KANA) (ill)

Fig. 10 : *R. chingii* HU Gosyo-ichigo

- (A) nearly reniform (2.0-1.3) ; reticulate, lum few, mur remarkable ; keel slightly rising
- (B) elliptic
- (C) elliptic ; margin undulate

Sp. ex. Pref. Yamaguchi, Tokuji-cho (ill.)

Pref. Oita, Mt. Hiko-dake (KYO)

Fig. 11 : *R. crataegifolius* BUNGE Kuma-ichigo

- (A) deltoid reniform (1.9-1.3) ; reticulate, lum small and numerous ; keel slightly rising
- (B) elliptic
- (C) elliptic ; margin undulate

The seeds which were sent from Romania as *R. crataegifolius* are different from those of Japanese ones in size and the sculpture of surface.

Sp. ex. Pref. Nagano, Mt. Yatsugatake (ill.)

Pref. Nagano, Mt. Azusa-yama

Pref. Nagano, Mt. Toyokuni-yama

Pref. Ishikawa, Mt. Hakusan

Pref. Kyoto, Mt. Hieizan

Pref. Tokushima, Mt. Tsurugi-san

Romania (cult. in Europe)

Fig. 12 : *R. corchorifolius* LINN. f. Birōdo-ichigo

- (A) nearly reniform (1.5-1.0) ; reticulate, lum deep, mur firm ; keel rising
- (B) elliptic
- (C) nearly circular ; margin undulate

Sp. ex. Pref. Kyoto, Arashiyama (ill.)

Pref. Kumamoto, Yamaga-shi (KYO)

Fig. 13 : *R. croceacanthus* LÉV. Ō-bara-ichigo

- (A) nearly reniform (1.3-0.7) ; reticulate, lum small, numerous and shallow ; keel slightly rising
- (B) elliptic
- (C) elliptic ; margin undulate

The seeds of Futenkan described as *R. okinawensis* (1.7-1.0) are larger than the others.

Sp. ex. Pref. Mie, Onigajo-yama (TI) (ill.)

Pref. Kagoshima, Kosugidani

Pref. Okinawa, Futenkan (KYO)

Fig. 14 : *R. grayanus* MAXIM. Ryūkyū-ichigo (Shima-awa-ichigo)

(A) nearly reniform (1.8-1.2) ; reticulate ; keel slightly rising

(B) elliptic

(C) broadly elliptic ; margin undulate

Sp. ex. Pref. Okinawa, Misato-mura (KYO)

Pref. Okinawa, Isls. Yaeyama (TI) (ill.)

Fig. 15 : *R. hirsutus* THUNB. Kusa-ichigo

(A) nearly reniform (1.5-0.8) ; reticulate, lum shallow

(B) elliptic

(C) elliptic ; margin undulate

Sp. ex. Pref. Kyoto, Kyoto-shi (ill.)

Pref. Ehime, Hirokata-mura (KYO)

Fig. 16 : *R. idaeus* L. var. *aculeatissimus* REG. et TIL. Ezo-ki-ichigo (Karafuto-ki-ichigo)

(A) nearly reniform (2.2-1.4) ; reticulate, lum slightly small and numerous

(B) elliptic

(C) elliptic ; margin undulate

As the seeds of *R. idaeus* v. *aculeatissimus* f. *concolor* from the foot of Mt. Muridake are a little different, we suggest here the necessity for further investigation.

Sp. ex. Pref. Hokkaido, foot of Mt. Muridake

Pref. Hokkaido, Sapporo-shi

cult. in Kyoto from Pref. Hokkaido, Sapporo-shi (ill.)

Fig. 17 : *R. idaeus* L. var. *yabei* (LÉV. et VAN.) KOIDZ. Miyama-uraziro-ichigo

(A) nearly reniform (2.4-1.5) ; reticulate, lum slightly small and numerous

(B) elliptic

(C) broadly elliptic ; margin undulate

The seeds of *R. idaeus* in Japan are similar except for the size to those of *R. idaeus* in Romania.

Sp. ex. Pref. Nagano, Mt. Yatsugatake (ill.)

cult. in Kyoto from Pref. Nagano, Mt. Togakushi

Romania

Fig. 18 : *R. ikenoensis* LÉV. et VAN. Goyō-ichigo (Toge-goyō-ichigo)

(A) nearly reniform (2.8-1.8) ; reticulate, lum few, mur firm

(B) elliptic

(C) elliptic ; margin undulate

The seeds of Mt. Iwate-san are similar to those of Mt. Hakusan, but those of Mt. Yatsugatake are different in the sculpture and form in lower view.

Sp. ex. Pref. Iwate, Mt. Iwate-san

Pref. Nagano, Mt. Yatsugatake (ill.)

Pref. Ishikawa, Mt. Hakusan

Fig. 19 : *R. illecebrosus* FOCKE Bara-ichigo

(A) deltoid reniform (1.7-1.1) ; reticulate

(B) elliptic

(C) broadly elliptic ; margin undulate

The seeds from Mt. Tsurugi-san (1.3-0.9) are smaller than the others.

Sp. ex. Pref. Shizuoka, Mt. Mafuji-yama
 Pref. Shiga, Mt. Horai-san
 cult. in Kyoto from Pref. Nara, Mt. Oomine (ill.)
 cult. in Kyoto from Pref. Tokushima, Mt. Tsurugi-san

Fig. 20 : *R. kisoensis* NAKAI Kiso-ki-ichigo

- (A) nearly reniform (2.1-1.3) ; reticulate ; keel rising
- (B) narrowly elliptic
- (C) elliptic ; margin undulate

The seeds of *R. kisoensis* are a little different as regards lum from *R. palmatus*. As there are only two specimens observed, it is highly necessary to investigate further.

Sp. ex. Pref. Nagano, Ohtaki-mura, Miura-forest (KYO) (ill.)
 Pref. Nagano, Ohtaki-mura, Ogawa-forest (KYO)

Fig. 21 : *R. koelmeanus* FOCKE Miyama-niga-ichigo

- (A) deltoid reniform (1.8-1.2) ; reticulate, lum small and numerous
- (B) elliptic
- (C) nearly circular ; margin undulate

The size of seed and lum from Yuki is larger than the others.

Sp. ex. Pref. Nagano, Mt. Yatsugatake
 cult. in Kyoto from Pref. Kanagawa, Tanzawa-Ooyama (ill.)
 cult. in Kyoto from Pref. Hiroshima, Yuki

Fig. 22 : *R. mesogaeus* FOCKE Kuro-ichigo

- (A) elliptical ovate (1.9-1.3) ; reticulate, lum deep ; keel rising
- (B) elliptic ; hilum almost basal
- (C) broadly elliptic ; margin undulate

Sp. ex. Pref. Iwate, Mt. Hayachine (KYO)
 cult. in Kyoto from Pref. Nara, Mt. Misen (ill.)

Fig. 23 : *R. microphyllus* LINN. f. Niga-ichigo

- (A) nearly reniform (1.8-1.2) ; reticulate, lum small and numerous
- (B) elliptical ovate
- (C) broadly elliptic ; margin undulate

The sculpture of seed-surface of this species is similar to that of *R. koelmeanus*.

Sp. ex. Pref. Kyoto, Mt. Daimonji-yama (ill.)
 Pref. Kyoto, Mt. Hieizan

Fig. 24 : *R. minusculus* LÉV. et VAN. Hime-bara-ichigo

- (A) nearly reniform (1.2-0.8) ; reticulate, lum shallow ; keel slightly rising
- (B) elliptic
- (C) elliptic ; margin undulate

The size of seeds from Mt. Kurino is exceedingly variable.

Sp. ex. Pref. Kagoshima, Mt. Kurino (KYO)
 cult. in Kyoto from Pref. Nara, Mt. Tamaki-san (ill.)

Fig. 25 : *R. oldhamii* MIQ. Sanagi-ichigo

- (A) deltoid reniform (2.4-1.7) ; reticulate, lum numerous
- (B) elliptic

(C) elliptic ; margin undulate

Sp. ex. Pref. Iwate, Ryusenkutsu (KYO)

Pref. Nagano, Mt. Toyoguchi-yama (TI) (ill.)

Fig. 26 : *R. palmatus* THUNB. Momiji-ichigo (Nagaba-momiji-ichigo)

(A) nearly reniforme (1.8-1.2) ; reticulate, mur firm ; keel slightly rising

(B) elliptic

(C) broadly elliptic ; margin undulate

The seeds from Mt. Ureira identified as *R. palmatus* v. *coptophyllus* are not distinct from the others.

Sp. ex. Pref. Iwate, Mt. Ureira (KYO)

Pref. Shiga, Hacchodaira

Pref. Kyoto, Mt. Daimonji-yama (ill.)

Pref. Kyoto, Mt. Hieizan

Pref. Tokushima, Tsurugi-san

Pref. Kagoshima, Isl. Yakushima

Fig. 27 : *R. parvifolius* LINN. Nawashiro-ichigo

(A) nearly reniform (2.4-1.5) ; reticulate, lum deep, mur firm

(B) oblong

(C) elliptic ; margin undulate

The size of seeds vary from 1.9-1.3 at Utano to 2.6-1.5 at Higashidori-mura. The seeds of *R. parvifolius* f. *flavus* from Suyama are similar to those of the others.

Sp. ex. Pref. Aomori, Higashidori-mura (TI)

Pref. Shizuoka, Suyama

Pref. Kyoto, Kyoto-shi, Arashiyama (ill.)

Pref. Kyoto, Kyoto-shi, Utano

Pref. Fukuoka, Hiraodai

Pref. Kagoshima, Isl. Yakushima

Hongkong

Fig. 28 : *R. peltatus* MAXIM. Hasunoha-ichigo

(A) nearly reniform (1.8-1.2) ; reticulate, lum not so deep ; keel slightly rising

(B) elliptic

(C) elliptic ; margin undulate

Sp. ex. Pref. Hiroshima, Mt. Kario-san (KYO)

Pref. Tokushima, Mt. Tsurugi-san (ill.)

Fig. 29 : *R. phoenicolasius* MAXIM. Ebigara-ichigo

(A) nearly reniform (1.9-1.3) ; reticulate, lum small, mur thin and firm ; keel slightly rising

(B) elliptic

(C) broadly elliptic ; margin undulate

Sp. ex. Pref. Nagano, Toyoguchi-yama

Pref. Tokushima, Mt. Tsurugi-san

cult. in Kyoto from Pref. Niigata, Isl. Sado (ill.)

cult. in Kyoto from Pref. Tokushima, Mt. Tsurugi-san

USSR

Fig. 30 : *R. pseudoacer* MAKINO Miyama-momiji-ichigo

- (A) nearly reniform (1.9-1.3) ; reticulate, mur not so firm ; keel slightly rising
- (B) elliptical ovate
- (C) elliptic ; margin undulate

Sp. ex. Pref. Tokushima, Mt. Tsurugi-san

cult. in Kyoto from Pref. Tokushima, Mt. Tsurugi-san (ill.)

Fig. 31 : *R. ribesoides* MATSUM. Birōdo-kaji-ichigo (Hachijyo-ichigo)

- (A) deltoid reniform (2.0-1.4) ; reticulate
- (B) elliptic
- (C) elliptic ; margin undulate

The size of seeds is different for those from the two localities, i. e. that of Kamino-shima is 1.7-1.1.

Sp. ex. Pref. Fukuoka, Isl. Kamino-shima (KYO)

Pref. Kagoshima, Isl. Akuseki (KYO) (ill.)

Fig. 32 : *R. sumatranus* MIQ. Kojiki-ichigo

- (A) nearly elliptic (1.3-0.8) ; reticulate, lum few, mur firm ; keel rising
- (B) elliptic
- (C) elliptic ; margin undulate

The seeds of this species as well as of *R. croceacanthus* belong to the group having the smallest ones.

Sp. ex. Pref. Kyoto, Kyoto-shi, Utano

cult. in Kyoto from Pref. Kyoto, Mt. Daimonji-yama (ill.)

Fig. 33 : *R. trifidus* THUNB. Kaji-ichigo

- (A) nearly reniform (1.7-1.1) ; reticulate, lum small, numerous and deep, mur firm ; keel conspicuously rising
- (B) elliptic
- (C) nearly circular ; margin crenate

The feature in transverse section is specific.

Sp. ex. Pref. Yamaguchi, Mishima-mura (KYO)

cult. in Sakai-shi, Pref. Osaka (ill.)

Fig. 34 : *R. vernus* FOCKE Benibana-ichigo

- (A) nearly reniform (deltoid reniform) (3.3-2.1) ; reticulate
- (B) elliptic
- (C) elliptic ; margin undulate

The seeds of *R. vernus* are the largest among *R. idaeus* type and are similar to those of *R. spectabilis* which were sent from Univ. Washington Arb. in Seattle, USA.

Sp. ex. Pref. Aomori, Mt. Daidake

Pref. Toyama, Mt. Asahidake

Pref. Ishikawa, Mt. Hakusan (ill.)

Fig. 35 : *R. yoshinoi* KOIDZ. Kibi-nawashiro-ichigo

- (A) nearly reniform (2.3-1.3) ; reticulate, lum a little large and deep, mur firm
- (B) elliptic
- (C) elliptic ; margin undulate

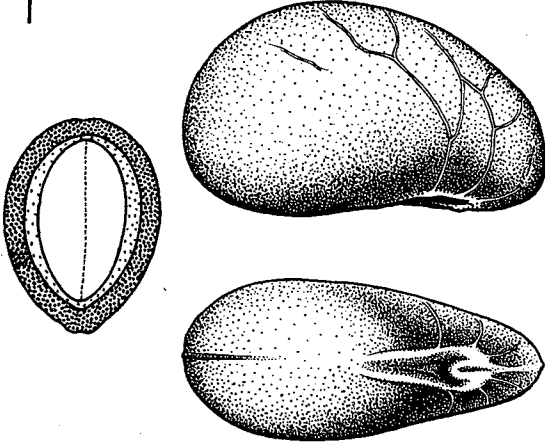
The seeds of this species are different in the sculpture and hilum from those of *R. parvifolius* which is considered as an allied species.

Sp. ex. Pref. Shimane, Mt. Sanbei-yama (KYO)
cult. in Kyoto from Pref. Hiroshima, Yuki (ill.)

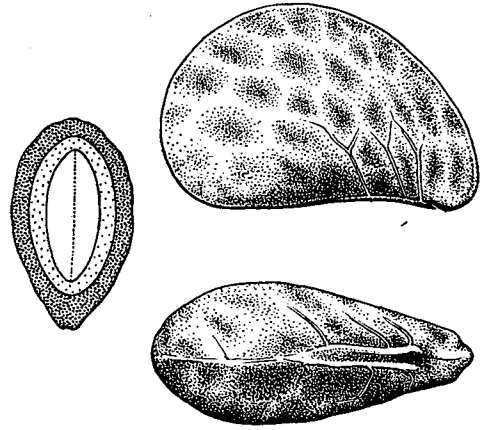
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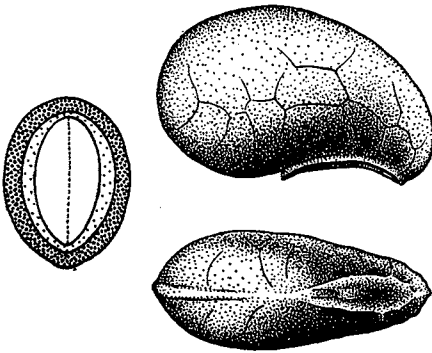
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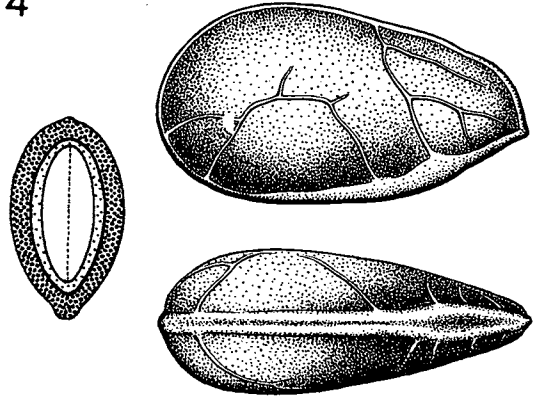
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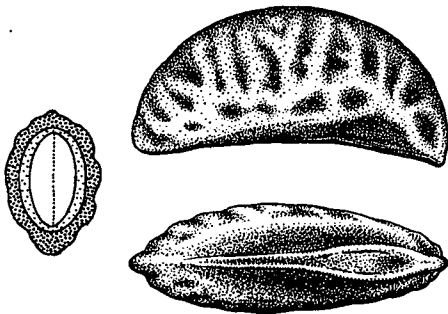
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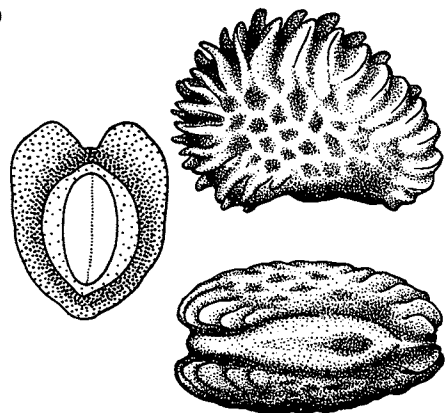
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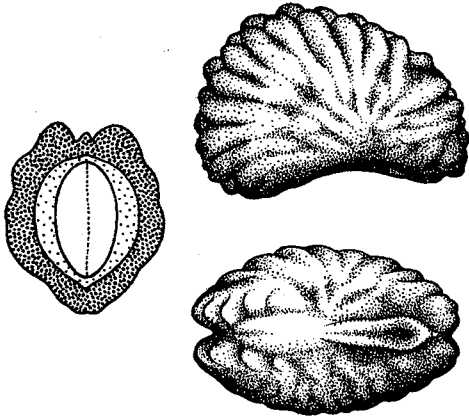
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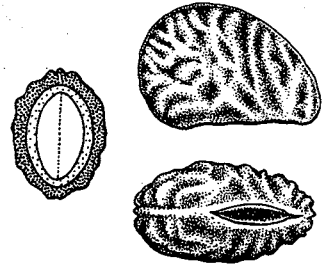
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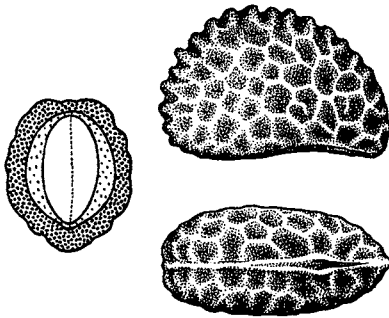
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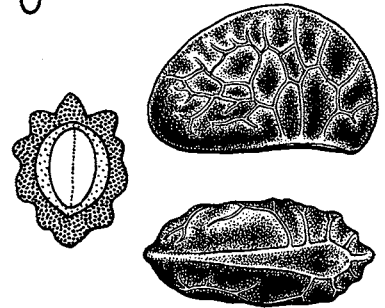
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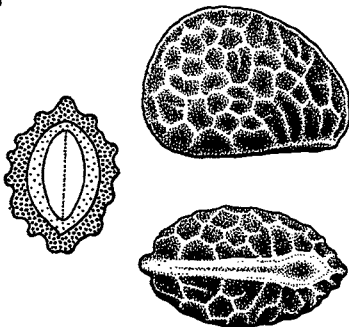
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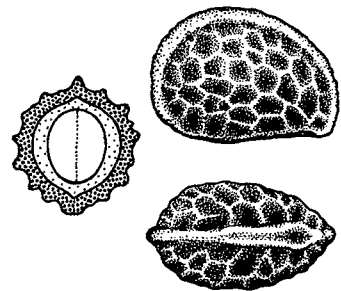
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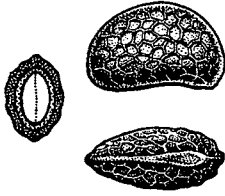
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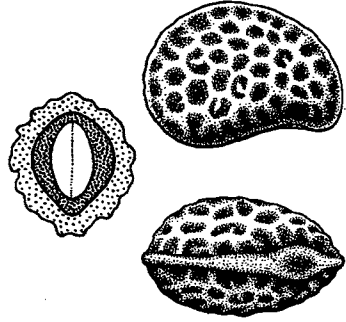
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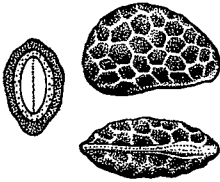
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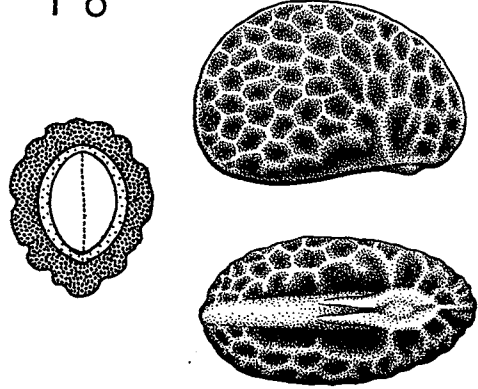
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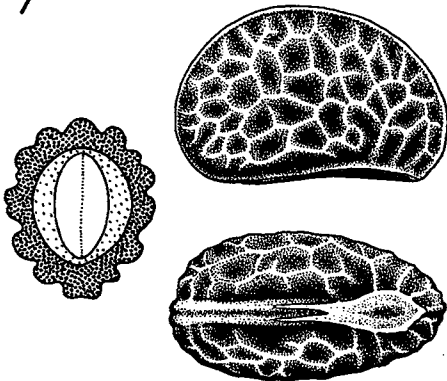
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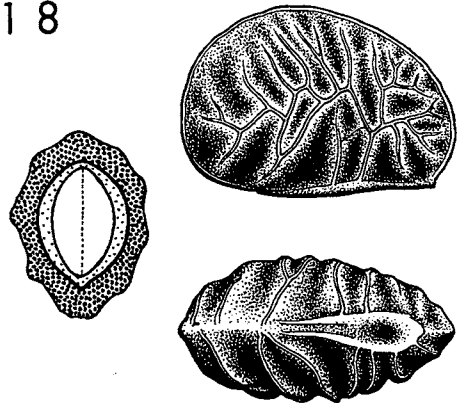
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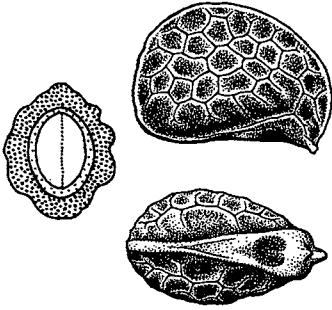
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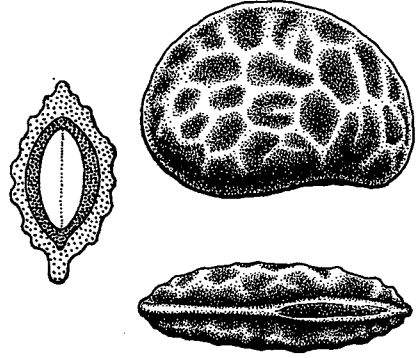
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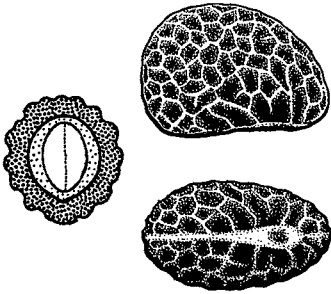
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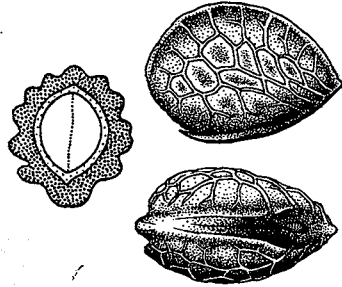
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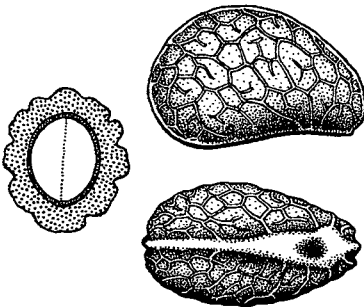
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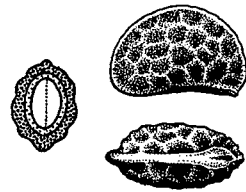
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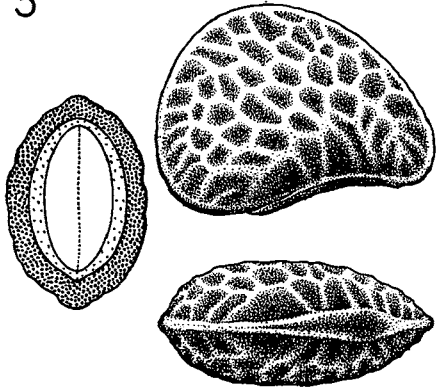
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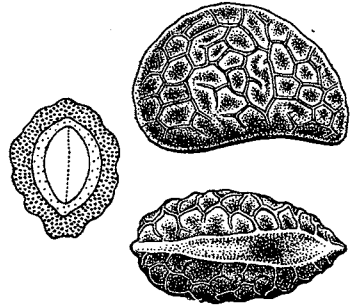
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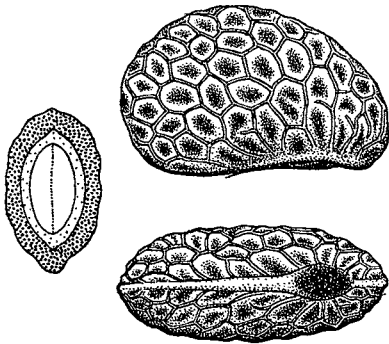
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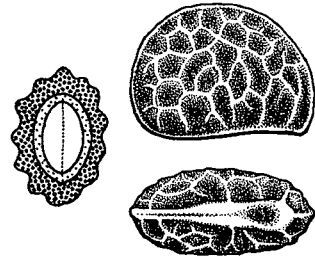
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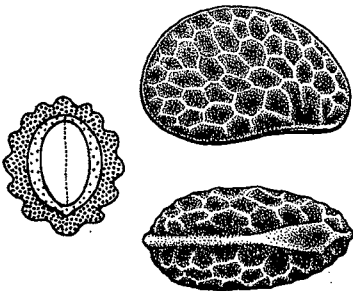
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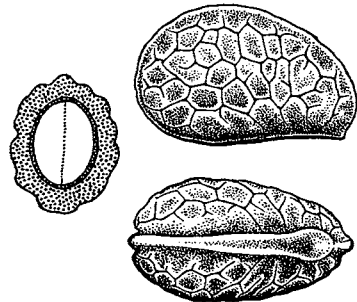
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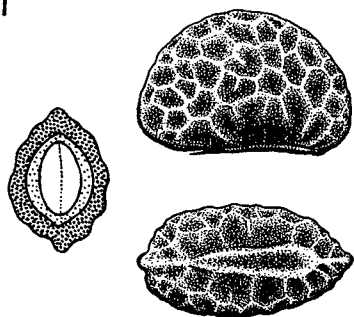
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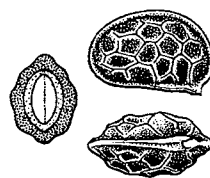
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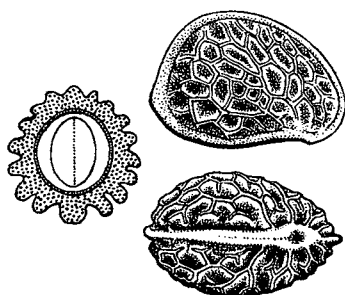
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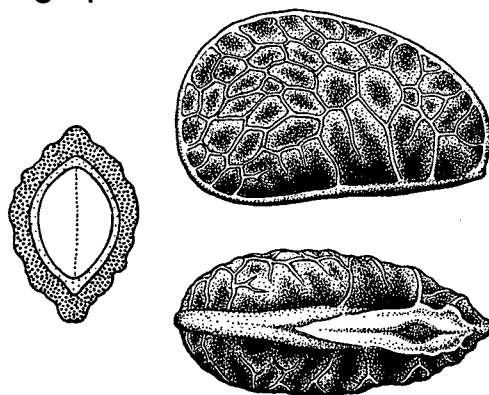
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