The variable efficiency of preservation among the pollens of different species has long been recognized and cannot be disregarded. The number of species in the northwest coast flora whose pollens are not well preserved is considerable, and one wonders how the interpretations of the profiles would be modified if the relative abundance of these species at different periods were known. At this point, as well as throughout his discussion, Prof. Hansen has to rely upon the assumption that the trees of the Pacific coast forests are reacting to their physical environments and to each other now as they have in all of postglacial time. There is in this assumption the idea that the occurrence and distribution of biotypes within the species has been identical or nearly so throughout the post-Pleistocene. To date, there is no proof of this. On the other hand, there are many suggestions in the studies of Stebbins, Anderson, Hultén, and many others. that notable changes have taken place with the expansion of species populations from Pleistocene refugia and mergence of these populations with others. Prof. Hansen makes no mention of such possibilities in his discussion. Küchler has postulated a biotype depauperation among the hardwoods of the Pacific Northwest during the ice age, but how effective this process was among the conifers is unknown.

Prof. Hansen is to be highly commended for an excellent discussion and a fine contribution to pollen analytical studies in America. He has threaded his way among the difficulties of the subject and its methods with great astuteness, and in spite of them has produced a well-reasoned paper.—Hugh M. Raup.

MINOR TRANSFERS IN PYRUS

M. L. Fernald

It seems to me quite impossible to maintain *Malus* Mill., *Sorbus* L. and *Aronia* Medicus as genera truly distinct on stable morphological characters from *Pyrus* L., unless we are to base our genera on merely local representatives and conveniently to ignore what these groups do in areas not so familiar to us. To those who know *Sorbus* only as it occurs as a series of indigenous trees in North America it is very conspicuously different, in its odd-pinnate leaves, very much branched cyme, and small fruits without grit-cells, from our introduced pears or from the apples, which have simple (though often lobulate) leaves, unforking pedicels, larger fruits with or without grit-cells etc. If we look into the Eurasian representatives of *Sorbus*, however, we shall quickly see that many of its species there have simple leaves, some of them with few (down to 6)-flowered inflorescences, which in fruit have almost simple branches or pedicels. Witness *Pyrus Miyabei* Sargent, illustrated, life-size, in a full-page figure in Garden and Forest, vii. 85, fig. 19 (1894), with leaves suggesting those of *Alnus*, a sparsely branched inflorescence of pear-like or apple-like flowers (shown 1.5 cm. broad) and a little inflorescence of 4 fruits, with deciduous calyx as in *Pyrus baccata* L. or *Malus*

baccata (L.) Borkh. Sargent, with growing material before him, considered it a *Pyrus*. Others, for instance Bailey in his Stand. Cycl. Hort. vi. 3179, treat it as *Sorbus alnifolia* (Sieb. & Zucc.) K. Koch and Bailey reproduced ("adapted") Sargent's illustration of his *Pyrus Miyabei* as representing typical *Sorbus alnifolia*. Rehder, likewise, in his Man. Cult. Trees and Shrubs, ed. 2: 380, 381 (1940) reduces *P. Miyabei* to *S. alnifolia*, with "infl. loose, 6–10-fld.". Since the fruit of this species is "subglobose, 8 mm. across, red and yellow" and "with deciduous calyx", it suggests to those not wholly on the inside the fruit of *Malus baccata*, described also by Rehder (pp. 392, 393): "fr. subglobose, 8–10 mm. across, red or yellow; calyx deciduous". If *Sorbus* is thus demonstrated to be a sound and morphologically different genus from *Malus* the profound difference is not made clear. *Malus*, by Rehder's description has "styles 2–5, connate at base" (p. 390); *Sorbus* has the stated distinction: "carpels 2–5, . . .; styles free or connate at base" (p. 373). Sargent's illustration of *Pyrus Miyabei* shows them connate at base as in *Malus*. Take your choice. I can see only one course, unless those who here see different genera know of fundamental differences which they can not express.

Aronia, with "styles 5, connate at base" is held apart from *Sorbus* (again using Rehder's keys) as follows:

> Styles 2–5: lvs. pinnate or simple and often lobed, usually with excurrent veins: calyx-lobes sometimes deciduous ..... 18. *Sorbus*
> Styles 5, connate below: lvs. simple, with curving veins, glandular-denticulate, glandular on midrib above: calyx-lobes persistent ..... 19. *Aronia*.

Obviously since, for example, the simple-leaved species of *Sorbus* § *Aria* have "fr. with persistent calyx-lobes", while the type of the section, *S. Aria*, has the styles "connate at base", those characters do not constantly separate *Sorbus* and *Aronia;* while *Malus*, with "Styles connate at base", has species (*M. baccata* etc.) separated from their allies because of "Calyx deciduous", the three species of this subgroup having respectively "styles 5, rarely 4", "Styles 3, rarely 4" and "Styles 4 or 5". Turning to *Aronia* with "Fls. in compound corymbs or panicles", the "compound corymbs" are often so simple and with such simple pedicels that they are "compound" only through wishful

thinking. Thus, in *Aronia prunifolia* (Marsh.) Rehder (*Pyrus floribunda* Lindl.) a very large proportion of the specimens in the Gray Herbarium have only 2 (even only 1)–5 or 6 flowers or fruits, each on an unforking pedicel; others, from farther south, have "compound corymbs". Similarly, *Aronia arbutifolia* (L.) Ell. (*Pyrus arbutifolia* (L.) L. f.) has "compound corymbs" through the southern two-thirds of its range, but at the northern limit of its range Nature did not clearly understand that it must have "compound corymbs", for there a large proportion of inflorescences consist of 1–6 unforking pedicels. The simpler or less compound inflorescences in *Aronia* are amazingly similar to the fruiting inflorescence of a *Pyrus* or of *Sorbus alnifolia*, as illustrated by Sargent and copied by Bailey.

By Rehder's key *Malus* has "fr. usually apple-shaped, without or with few grit-cells", while *Pyrus* has "fr. usually pear-shaped, its flesh with numerous grit-cells". But *Malus*§§*Eriolobus* and *Docyniopsis* have "Fr. with grit-cells", while, as pointed out by me in Rhodora xlv. 451 (1943), "of the Pears treated in Rehder's Manual ('fr. usually pear-shaped') 13 out of the 15 species have the fruit described as 'globose' 'globular' 'subglobose' or 'ovoid'; while such a species as *Malus Halliana* is described in Rehder's key as having 'fr. pyriform'. The terms 'apple-shaped' and 'pear-shaped' thus become a bit vague". When, furthermore, we consider *Pyrus domestica* (L.) Sm. or *Sorbus domestica* L., we get pretty far from conventional *Sorbus*. *S. domestica*, with pinnate leaves of Mountain-Ash, has "Fr. 1–3 cm. across, apple- or pear-shaped, yellowish, with red cheek and with grit-cells" (Rehder). The fruit, according to Bean, Trees and Shrubs Hardy in Brit. Isl. 296 (1914), "is sometimes eaten in a state of incipient decay [as is that of the subglobose-fruited Chinese Pear, *Pyrus pyrifolia* (Burm. f.) Nakai (which Burmann thought to be a fig!), much naturalized in southeastern Virginia], especially in France . . . Mr. E. Burrell, late gardener to H. R. H. the Duchess of Albany at Claremont, in a letter . . . observes that 'we are sending good fruits of the pear-shaped service for dessert at the present time'". Her Royal Highness might not have been so pleased had he sent for dessert the fruits of *Sorbus Aucuparia*, a conventional Mountain-Ash.

Another point. Although *Malus* is too conservative to mix

itself in nature with the others, *Sorbus* and *Aronia* freely hybridize, producing mongrels of very nondescript appearance, × *Sorbaronia* Schneid.; *Sorbus* likewise crosses with *Pyrus*, producing × *Sorbopyrus* Schneid.; it will also mix with *Amelanchier*, producing × *Amelasorbus* Rehder. What wonder, then, that, within its own reputed confines *Sorbus* may in foliage and fruit simulate *Malus* and in its fruit simulate *Pyrus*. Cytologists have shown that cytologically there is no valid ground for separating *Pyrus*, *Malus*, *Sorbus* and *Aronia* and such an unquestioned anatomist as Professor Irving W. Bailey tells me that anatomically the woods are essentially indistinguishable. I am content to leave *Pyrus* intact, in this agreeing with DeCandolle, Endlicher, Bentham & Hooker, Focke, Engler & Prantl, Gray and many others of sound and world-wide outlook.

Unfortunately the following members of the complex genus *Pyrus* require formal transfers:

PYRUS CORONARIA L., var. **dasycalyx** (Rehder), comb. nov. *Malus coronaria* (L.) Mill., var. *dasycalyx* Rehder in Journ. Arn. Arb. ii. 52 (1920).

P. CORONARIA L., var. **lancifolia** (Rehder), stat. nov. *Malus lancifolia* Rehder in Trees and Shrubs, ii. 141, pl. 158 (1911). *P. lancifolia* (Rehder) L. H. Bailey in RHODORA, xviii. 154 (1916).

I find myself heartily in agreement with that cautious and very experienced student of plants in the field, Dr. C. C. Deam who wrote in his Flora of Indiana, 528 (1940): "The genus *Malus* of 'Trees of Indiana' was written by W. W. Eggleston. A careful restudy of my specimens convinces me that those using a local flora of this kind will be best served by regarding this species [*M. coronaria*] as polymorphic in many of its parts. Specimens can be found that show wide differences but these can be connected by intermediates". Even so, vars. *dasycalyx* and *lancifolia* seem to be reasonably good geographic varieties. This can not be said for many recently proposed segregates in the group.

× P. **Jackii** (Rehder), comb. nov. *Sorbaronia Jackii* Rehder in Journ. Arn. Arb. xx. 95 (1939).

× P. **mixta,** nom. nov. *Mespilus sorbifolia* Poir. Encycl. Suppl. iv. 73 (1816); *Crataegus sorbifolia* Hort. ex Poir. l. c. (1816). *Sorbus sorbifolia* (Poir.) Hedl. in Kgl. Sv. Vet. Akad. Handl. xxxv[1]. 114 (1901); *Sorbaronia sorbifolia* (Poir.) Schneid. in Fedde, Repert. Sp. Nov. iii. 134 (1906); not *Pyrus sorbifolia* Cham. ex

Spreng. Syst. iv. Cur. Post. 343 (1827). *Sorbus Sargenti* Dippel, Handb. Laubholzk. iii. 373 (1893), not *Pyrus Sargenti* (Rehder) Bean, Trees and Shrubs Hardy Brit. Isl. ii. 293 (1914).

P. DECORA (Sarg.) Hyland, var. **groenlandica** (Schneid.), comb. nov. *Sorbus americana* Marsh., var. *groenlandica* Schneid. in Bull. Herb. Boiss. sér. II, vi. 314 (1906). *S. decora*, var. *groenlandica* (Schneid.) G. N. Jones in Journ. Arn. Arb. xx. 30 (1939).

× P. **fallax** (Schneid.), comb. nov. *Sorbaronia fallax* Schneid. Handb. Laubholzk. i. 676 (1904).

NAJAS MUENSCHERI AND OTHER SPECIES OF NAJAS IN EASTERN VIRGINIA

ROBERT T. CLAUSEN

Prof. Fernald (RHODORA **49:** 105–106. 1947) has commented on the *Najas* found in the Virginian estuaries. Tentatively he has identified his and Mr. Long's collections as ? *N. flexilis*, *N. guadalupensis* and ? *N. gracillina*. The specimens which are the basis for these reports have been made available to me through the courtesy of Prof. Fernald. I report on them in the order as listed by him.

? "N. flexilis (Willd.) Rostk." Three collections are involved: Fernald and Long no. 12,520 from the Mattaponi River, King William County, and F. & L. nos. 12,523 and 13,214 from the Chickahominy River, New Kent and Charles City Counties respectively. These plants have the habit of *N. Muenscheri*. The styles are 0.5–1.2 mm. long. The seeds are slender, four to five times as long as wide, 2.2–2.6 mm. long and 0.4–0.5 mm. wide. Only a few seeds are so far available, making a detailed study of variation impossible. Seven mature seeds average 2.5 mm. in length. Seeds of *N. Muenscheri* in the Hudson River average 3.2 mm. in length with extremes of 2.4 and 4 mm., and extremes in width of 0.6–0.7 mm. The seeds of the collections from Virginia are lustrous, as in *N. flexilis*, but with very small areoles as in *N. Muenscheri*. These areoles often tend to be longer than wide, whereas in *N. flexilis* the majority of the areoles are as broad as long, also larger. Except for the length of the seeds, the Virginian specimens match the collection of Muenscher and Clausen no. 4273 from the mouth of the Mohawk River, Waterford, N. Y. The specimens from Waterford, with lustrous