ALASKA PIONEER FRUIT GROWERS' NEWSLETTER

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January Meeting Announcement

The next monthly meeting will be held at Dimond Greenhouses at 7 PM, Thursday, January 18, 1996. Bob Boyer has received two new videos on high-density orcharding, and he will show one or both of these.

Results of Fall Apple Tasting

by Dwight Bradley

The Club's annual tasting of Alaskan-grown apples was held on September 28, 1995 at the Bradleys' in Peters Creek. Twenty-six different varieties were tasted, along with several duplicates. The clear favorite was Tom Marshall's Oriole apple, followed by Parkland, Norland, Lodi, and Whitney Crab. Twenty tasters rated the apples for taste (not size, appearance, or cooking quality) on a scale of one (lowest) to ten. The average scores:

9-10. Oriole

7-8. Parkland (grown by O'Brien)

6-7. Norland (grown by Bradley), Lodi, Norland (grown by O'Brien), Parkland (grown by Dearborn), Whitney Crab, Hugh Harris mystery apple, Novosibirski Sweet, Norland (grown by M. Green), Yellow Jay.

5-6. Golden Transparent (grown by Butcher), Tony Root mystery apple, Rescue (grown by Bradley), Adanak, Viking, 8th&M mystery crab, 8th&M mystery apple, Red Transparent.

4-5. "Anoka or Rescue", Heyer 12, 15th&I mystery apple, Summerred, Rescue (unknown grower), Heyer 20, Westland, (grown by Franke), Wealthy, Westland (grown by Vochoska).

3-4. Mantet, 10th and E mystery apple

2-3. Helen Butcher mystery crab

As usual, Parkland and Norland were among the winners, reinforcing their reputation as always being reliable producers in south-central Alaska. Mantet, which was rated highest at our 1994 tasting, finished way back in the pack this year. I suspect that Mantet needs a summer more like 1994 (warm and sunny) and less like 1995 (cool and drizzly) to ripen to perfection. This was the first year that the 8th & M mystery apple (different from the 8th & M mystery crab) was tasted by the group as a whole. It was unripe and nowhere near as good as in 1994 when I first described it.

As I noted in my 1994 apple-tasting report, the ratings are usually based on a single apple, so there is a certain amount of luck involved. Summer apples (that is, everything grown in Alaska) are notorious for uneven quality. Quality depends on how long ago an apple was picked, how it was handled and stored between picking and eating, whether it grew in a sunny or shady spot on the tree, weather during the growing season, and any number of other factors. During September, I sampled Norland, Parkland, Rescue, Yellow Transparent, and Yellow Jay that I would have rated between 8 and 9, several points higher than I rated the particular specimens that someone happened to bring to the tasting. The tasting was held about a week later than in 1994, and, despite the generally poor summer weather, there were fewer grossly underripe apples.

It should be emphasized that fresh eating is not the only basis for judging apple quality. Westland, for instance, is a giant, sour apple that usually rates fairly low for fresh eating, but it makes fantastic pies. Similarly, the various small crabs usually don't score too well in apple tastings but many of them make great jellies.

At the end of the evening we pressed about a half-gallon of sweet cider from the leftovers and surplus apples. It was excellent.

Linda Billington of the Anchorage Daily News reported the event, the second straight year for this sort of publicity.

A Technique to Relocate Graft Positions

by Joe Orsi

This year I topworked numerous varieties on to most of my apple trees. Topworking a tree enables you to evaluate multiple varieties in a relatively short time frame and in a limited amount of space. Of course, this is as long as you can relocate and identify your topworked varieties. Because I do not trust the longevity of external labels, I came up

with an innovative technique to record graft positions on a tree using a measuring tape, a compass, a pencil, and a notepad. Even if you are sold on external labels, this technique would be a good way to "backup" those labels.

To record graft position on a particular tree, I initially note the scion variety used and its number of buds. Then, I note the distance and direction (compass bearing) from where the base of the tree meets the ground to where the new graft union is on the tree. Using this technique, I can readily locate a grafted variety on any of my trees. This year I recorded 118 grafts of 66 varieties on 35 trees. Here is an example of how I would record four grafts of two varieties on a Yellow Transparent:

Grafted varieties:
Early Harvest (NW- 68"-6B; SE-76"-2B), and
Carroll (E-45"-3B; S-40"-8B)

Date: 1 April 1995

Mother tree: Yellow Transparent on Antonovka (planted 1991, plot B)

In order to relocate the underlined graft of Early Harvest, I would measure 68" up from where the base of the tree meets the ground in a NW direction. There, I would hopefully find a graft union with a six bud scion on it. I painted the scions topworked last year a white color so they wouldn't be confused with the scions topworked this year. To make identification of topworked varieties even simpler, I try and graft different colors of apples on to a particular tree. Although from past experience the "true" colors of some apples often don't materialize under Alaskan growing conditions.

Over time, the measured distances from the trunk base to the graft union may shrink due to trunk and limb expansion; however, this reduced distance should be relatively the same for all grafts on a particular tree. The compass bearing from the base of the trunk to the graft would likewise not substantially change unless the tree was moved or the limb that was grafted on to broke off.

Honey Bee Fun

by Joe Orsi

This year I tried to improve the pollination success of my fruit trees by keeping honey bees near our home in Auke Bay. I was fortunate to acquire some beekeeping supplies from a person who raised bees in Juneau about ten years ago. I also ordered beekeeping supplies from Brushy Mountain Bee Farm, Inc. and then began to look for a bee source. It was just my luck to discover that in 1995, the U.S. Postal Service had decided to not handle live shipments of bees, and UPS was also not interested in shipping bees. As a result of this shipping dilemma, several bee sources discontinued selling bees to Alaska. Thanks to the help of Elden Jeffers, of the Southcentral Beekeepers Association, I located a bee source who would ship bees to Alaska (Taber's Honey Bee Genetics). Because Alaska Airlines required a $30 minimum for "counter to counter" live shipments, I went in with two other beekeepers and ordered six units at $37 each. A unit consisted of 3 lbs of Italian bees and one queen. I kept one unit, sold another to a fellow beekeeper, and the four remaining units were shipped to Haines. The shipping cost from Sacramento to Juneau split between the six units was $13 each.

When the bees arrived in late April, it was a hot spring day and Alaska Air Cargo was mighty glad to see me pick up my noisy merchandise. I was quite nervous loading 18 lbs of buzzing insects into my Subaru with only thin screens separating them from me. I drove away cautiously because I did not want to get into an accident. I arrived home and carefully unloaded my cargo to the shade; there I got my first (and only) sting through the screen on my thumb. Off to good start, I thought, and I haven't even released my bees into the hive yet.

That evening I donned my new beekeeping suit, gave my three pounds of caged bees a slathering of sugar syrup, and when they were fat and happy I shook them into my hive. This was, as one of my beekeeping books aptly stated: "one of the most nervous-making step in you beekeeping career". About half of the bees were still clustered around the small queen cage inside the shipping container. I reached in and extracted the queen cage from within the bee cluster and suspended it between two frames in the middle of the hive. The purpose of the queen cage is to slowly acclimate the queen and her phermones to the workers, so they won't reject her. This acclimation takes several days which is about the time it takes for workers to chew out a tunnel in a candy plug within a tube in the queen cage.

Things appeared to be going well with my bees for the first few weeks, that is, until the bear showed up in early June. I had inspected my hive one morning and saw that my sugar syrup jar was missing, there were large tooth marks on my hive, and some bear scat was present within spitting distance of the hive. I needed to do something. I didn't feel justified in killing the bear because it had a sweet tooth, so I spoke to some game biologists about bear deterrents. The next day I constructed an electric fence which I purchased from Swampy Acres, a local feed store. A couple days after my project was complete I saw the fence in action. I had come home for lunch and was walking toward my bee hive when I noticed the "bear" as he approached the fence. He hadn't noticed me, so I slowly walked over toward our chicken coop and activated the fence. Mr. bear touched the fence, snapped back, and bolted into the woods. He never bothered the bee hive again.

Over the course of the spring and summer, my bees were typically active when it was calm out and temperatures

were above 50 degrees. I did see the bees visit my apple and cherry blossoms, but poor weather in early June reduced their activity. When conditions permitted, the bees were active in the pussy willow, salmonberries, clover, fireweed, raspberries, hairy vetch, scarlet runner beans, and Sitka roses. For some reason they left the blueberries to the bumblebees. When the fireweed was in full bloom, I located my bees--by the hundreds--up to a half mile away!

By mid summer I added another full frame hive body on top of the first one because the hive appeared to be getting crowded. This was done to prevent the bees from swarming. In retrospect, I should have added a queen excluder panel between the hive bodies to prevent the queen from moving "upstairs" to raise brood as opposed to just the workers moving up through the excluder and building comb and capping off honey. Being a novice beekeeper, however, I underestimated how long it actually took the bees to draw out the comb on both sides of each sheet of beeswax foundation. They never fully filled both the hive bodies. So by the end of July, I had a lot of bees but not much honey. In August, we all had a "taste" of honey which only amounted to a few ounces.

Rather than killing all my hard working bees off in the Fall, and harvesting the "gallons" of honey I had envisioned collecting, I decided to feed them from late August until late September with enough sugar syrup to hopefully sustain them for the winter. I subsequently fed them about four gallons of sugar syrup and they capped off about 70-80% of the availible comb with honey. In October, I insulated the hive with 2 inch foam board and leaned a couple wooden pallets against the hive and covered them with a tarp so heavy snow wouldn't smother the hive. As of Thanksgiving, most of my honey bees appeared to be still alive. Just five short months until spring!

In summary, beekeeping turned out to be more fascinating than I had anticipated. I became a lot more attached to the little creatures than I thought I would, and the educational aspect of the experience was well worth the endeavor. As far as pollinating my fruit trees, yes honey bees do help, but the weather still needs to be cooperative in order for the bees to fly during blossom time. One of the timeless pleasures of beekeeping for me was firing up the smoker and "working" the bees with my kids and their friends.

Honey Bee Source:

Taber's Honey Bee Genetics
P.O. Box 1672
Vacaville, CA 95696
(707) 449-0440

Beekeeping Supply Source:

Brushy Mountain Bee Farm, Inc.
610 Bethany Church Rd.
Moravian Falls, NC 28654
1-800-233-7929

Electric Fence Source:

Swampy Acres
10400 Glacier Highway
Juneau, Alaska 99801
789-7253

Nineteenth-Century Russian Apple Varieties in Alaska

by Dwight Bradley

My interest in Russian apples was recently rekindled by a short note by George Quesada in the Fall 1995 issue of *Pomona*. Quesda came across an 1884 booklet by Charles Gibb of Montreal titled *On the Russian apples imported by the U.S. Dept. of Agriculture in 1870*. Xerox copies of the article, which contains descriptions of several hundred types, can be obtained from Quesada (1860 Virginia Ave., Novato, CA 94945, $6.50 postpaid). The report by Gibb is a gold mine for the apple variety enthusiast.

The 1870 shipment consisted of nearly 1000 varieties of Russian apples. A few Russian varieties, such as Red Astrachan, had already come to America by this time, but the 1870 shipment greatly increased the depth of the apple's gene pool in America, which up until then had been dominated by the English and French apples, and their offspring. The Russian scionwood was collected from latitudes 45° to 60°, and much of it was from the St. Petersburg area (about 60°N; Anchorage is around 61°N). Because many of the problems with apple growing in south-central Alaska relate to September day length, winter cold, and/or short growing season, time-tested varieties from the northern part of Russia would be of obvious interest here.

Between 1870 and about 1900, hundreds of thousands — possibly even millions — of the Russian apple scions were sent out by the USDA for trial by growers across the northern states and Canada, mostly in the 40-50° N latitude range. As a result of these tests, such varieties as Yellow Transparent, Tetovski, Red Astrachan, Duchess of Oldenburg, Lowland Raspberry, Antonovka, Borowinka, Duchess of Oldenburg, and Alexander found favor and are still with us today. I quickly scanned the Bear Creek catalog and counted 127 apple varieties, of which 8 are 19th-century Russian imports. Another 17 of the Bear Creek listings have Russian ancestors. For example, Norland and Parkland are crosses of Rescue and Melba (Rescue, in turn, is a seedling of the Russian Blushed Calville); Mantet is a seedling of Tetofsky; and Oriole is a cross of Yellow Transparent and Liveland Raspberry. Without the Russian varieties, Alaskan apple growers would have little to choose from!

For every Russian variety that has survived, many more are either extinct or, conceivably, still surviving in obscurity. This is an unfortunate loss for us in Alaska because it would have been nice to test all 1000 of them in various parts of Alaska. (Some Russian varieties were

tested at Sitka around the turn of the century, as described in Joe Orsi's article in the Summer 1995 *Pomona*.) It is well known that the same variety will perform differently in Alaska than in the Lower 48. For instance, Yellow Transparent begins to ripen in late July at the Geneva experiment station in upstate New York. But it often goes mushy on the tree before even ripening, and only keeps for a few days. It makes pretty good pie and sauce, but isn't much good for fresh eating. In south-central Alaska, by constrast, Yellow Transparent can be a remarkably good eating apple, and it has been known to keep til Christmas. In other words, it's a much better apple when grown in Alaska. Who knows how many other potentially successful Russian varieties were abandoned without an adequate trial in Fairbanks, Talkeetna, Anchorage, Kenai, Haines, and so on.

In volume 2 of Beach's *Apples of New York* (1905), 37 Russian apples are described, many of them in great detail. Of these, the only ones of potential interest to Alaskan growers are those that ripen with Yellow Transparent, or possibly a few weeks behind (i.e. no later than about mid-August at Geneva). Eight of the Russian varieties were said to be in season starting in late July. The best known of these are Yellow Transparent, Lowland Raspberry, and Tetofsky, and Red Astrachan. These are readily available from St. Lawrence and/or Bear Creek, and any number of Alaskan growers are growing them. Indeed, the first three were among the few successful varieties at Sitka in the early 1900s. The other four Russian varieties that Beach (1905) recorded as ripening in July are Red Transparent, Thaler, Raspberry , and Vineuse Rouge. I can't remember ever running across any of these in catalogs, or in scionwood lists of variety collectors. They would be well worth the effort to locate.

Notes on some "lost" Russian varieties of potential interest for Alaskan growers. Each of these have obvious shortcomings when grown in upstate New York — but how would they do in Alaska?

Raspberry. According to Beach (1905, v. 2, p. 177): " A Russian apple, small, fine dark red, sprightly subacid; season July and August. Hansen states that it is exceedingly productive and a good substitute for Red June where that variety winterkills."

Red Transparent. According to Beach (1905, v. 2, p. 182): "A Russian variety of little value where Primate can be grown. Fruit medium size with pale skin nearly covered with red and overspread with delicate bloom. Basin irregularly wrinkled; calyx prominent, closed; flesh greenish-white, not very crisp; water-cores badly; season late July and early August."

Thaler. According to Beach (1905, v. 2, p. 222): "A Russian variety of the Yellow Transparent type. It resembles the Yellow Transparent so closely that some have considered them identical, but they are distinct. Since Yellow Transparent is superior in health, vigor, and productiveness, Thaler is not recommended for planting."

Vineuse Rouge. Excerpts from Beach (1905, v. 2, p. 233-234): "Tree a strong grower, round topped, a heavy annual bearer. ... Flesh white, firm, juicy, subacid, good for table, very good for cooking. Season very early, about one week before Yellow Transparent, but perishable and should be picked early to prevent watercoring and rotting on the tree."

Notes on some surviving Russian varieties:

Borowinka. Excerpts from Beach (1905, v. 2, p. 24-25): "Borowinka resembles Oldenburg so closely that Hansen says the question of their identity has not been settled. As fruited at this station (i.e. Geneva, N.Y.) it is distinct from Oldenburg. ... Tree below medium size but moderately vigorous. ... Fruit below medium to large, averaging medium; pretty uniform in shape but not in size. ...Skin thin, very tender, smooth, often covered with broken stripes and irregular splashes of attractive bright red, overspread with a thin buish bloom. ... Flesh tinged with yellow, medium in grain, crisp, tender, moderately juicy to juicy, agreeably subacid, slightly aromatic, good. Season mid-August to mid-September."

Borowinka is now propagated as a hardy rootstock, but of course it was originally selected in Russia, and imported by Budd in 1870, for its apples, not for its roots. Even though Duchess of Oldenburg has never done too well in south-central Alaska, it would be worth the effort to let a few Borowinka rootstocks grow up and set a crop of their own fruit.

Lowland Raspberry was considered a synonym of Liveland Raspberry (or Livland Raspberry) by Gibb (1884) and Beach (1905). The Bear Creek catalog, however, lists Lowland as having originated in Russia in the 1860's as a cross of P.I. 143181 and Livland Raspberry. I think the Bear Creek geneology is probably mistaken (I doubt that anybody in the 1860s was using 6-digit numbers for seedlings), and that Lowland and Liveland are the same. In my orchard, I used to have a Liveland from St. Lawrence Nurseries that, until voles girdled it, looked just like my whip of Lowland from Bear Creek. The surviving Lowland Raspberry has dozens of fruit spurs and should finally bear in 1996, its fifth summer.

Red Astrachan I used to have one from Bear Creek and another from St. Lawrence, and they were totally different varieties. As it turned out, they were both wiped out at age three by the winter of 94-95, so my personal dilemma over which was the *real* Red Astrachan is not so pressing anymore. Nonetheless, I suspect that a number of non-genuine Red Astrachans are in circulation.

Have you paid your dues for 1996?
Membership is $16 payable to the Alaska Pioneer Fruit Growers, c/o Pam Warner (address on page 1).

ROOTS
Returning to the Apple's Birthplace

by Sean Adams

(The article that follows was reprinted from *Agricultural Research*, U.S. Dept. of Agriculture, Agricultural Research Service, Nov. 1994, p. 18-21).

The quest for new apple genes takes ARS plant explorers to Central Asia.

Fritz Wafler has been in the apple business since the 1960's. Today he grows 12 popular varieties—including McIntosh, Jonagold, and Empire—on his 250-acre apple orchard in Wolcott, New York, near Lake Ontario. One of his biggest expenses is the chemicals to control insects and diseases. Pesticides cost him about $200 per acre, per year—an expense he'd rather do without.

"We get a lot of flak for spraying," he says. "Farmers would be the first to admit that they would be happier if they didn't have to spray."

Wafler hopes that eventually he'll be able to grow apples that have genetic resistance to insects and diseases, allowing him to reduce or even eliminate pesticide applications.

The best bet for finding genetic resistance lies in the seeds of the wild apples that Agricultural Research Service scientist Philip L. Forsline and his fellow explorers have found in the mountains of Kazakhstan and Kyrgyzstan.

"I really hope the apples they brought back can help us," Wafler says. Forsline is optimistic they will.

In September 1993, he organized and led a collection trip to the two countries in Central Asia. Three other scientists were part of the research team—taxonomist Elizabeth E. Dickson of Cornell University, fruit tree disease expert Gaylord Mink of Washington State University, and breeder Dominique Noiton of Havelock North Research Center in New Zealand. They spent 22 days collecting wild apples in areas where western scientists have never explored before.

Their goal was to scour the rugged foothills for apples in the place where scientists believe the domestic apple *(Malus x domestica)* was born and evolved—its center of origin, as curators say.

The expedition was a follow-up to an earlier trip that Dickson, Cornell plant pathologist Herb Aldwinckle, and ARS botanist Calvin R. Sperling made to neighboring areas in 1989.

KEITH WELLER

Philip Forsline, curator for the apple and grape germplasm at Geneva, New York, displays apples that show the diversity in the collection. The Wolf River in his right hand weighs 20 ounces and measures 4-1/2 inches across. (K5340-9)

The explorations are part of an ongoing effort by scientists with ARS, universities, and other institutions to preserve valuable genes that may otherwise be lost due to neglect, development, or other factors.

The germplasm—usually cuttings or seeds—is housed in storage facilities where it can be saved for use by breeders to improve agricultural crops.

The need to preserve germplasm is immediate, says Forsline, curator for the apple and grape collection of the ARS Plant Genetic Resources Unit at Geneva, New York. In one area of Kazakhstan, near the capital of Almaty, nearly 80 percent of wild fruit forests have disappeared since 1960 because of development. In another area, in Kyrgyzstan, the government has mandated harvesting walnut trees for wood—threatening the diversity of that nut tree.

"We were very fortunate to be able to collect germplasm from these areas, because no one knows how long it will be there," Forsline says.

It's too early to tell how valuable the newly collected apple germplasm is. Some of the seeds from the 1993 trip have been planted and have grown into seedlings, but it can take from 5 to 7 years for them to mature and bear fruit. Forsline says 400 trees are now growing outdoors from seed collected during the 1989 trip. But, in their fourth year, only three of them are fruiting.

"We are confident that we collected apples in remote places that western scientists have probably never explored before," he says. "We think the germplasm will help us widen the genetic base of our collection. Many of the apples we collected are in the wild species *Malus sieversii,* a major genetic contributor to *M. x domestica*."

In 1989, scientists returned with 114 apple samples—called accessions. During the 1993 trip, they collected 129 more, representing 24 crop species—including apples, pears, hawthorn, hops, walnuts, pistachios, and grapes. They brought back 78 cuttings and 33,000 seeds—including 18,000 apple seeds. Some of the seeds have been planted, have grown into seedlings, and are under evaluation by scientists around the country and world, Forsline says.

Preliminary results are encouraging. Aldwinckle, who chairs the Apple Crop Advisory Committee and is evaluating the germplasm in a

The Fergansky Range towers above wild apple and walnut forests in the Republic of Kyrgyzstan.

cooperative project with ARS, says some of the seedlings from the 1993 trip have resistance to apple scab, based on early greenhouse studies.

Apple scab, a fungal disease, is among the most serious problems for apple growers, blemishing fruit and causing millions in losses each year.

"Resistant seedlings wouldn't have to be sprayed with fungicides to control the scab," he says.

Aldwinckle says he will also test seedlings from the 1993 trip for resistance to rust, fire blight, and powdery mildew diseases. He says germplasm he has screened from the 1989 trip has resistance to scab, fire blight, and rust. "We think apple germplasm from the two trips will be of great interest to breeders looking for resistance to these diseases," he says.

Wild Apple Antecedents

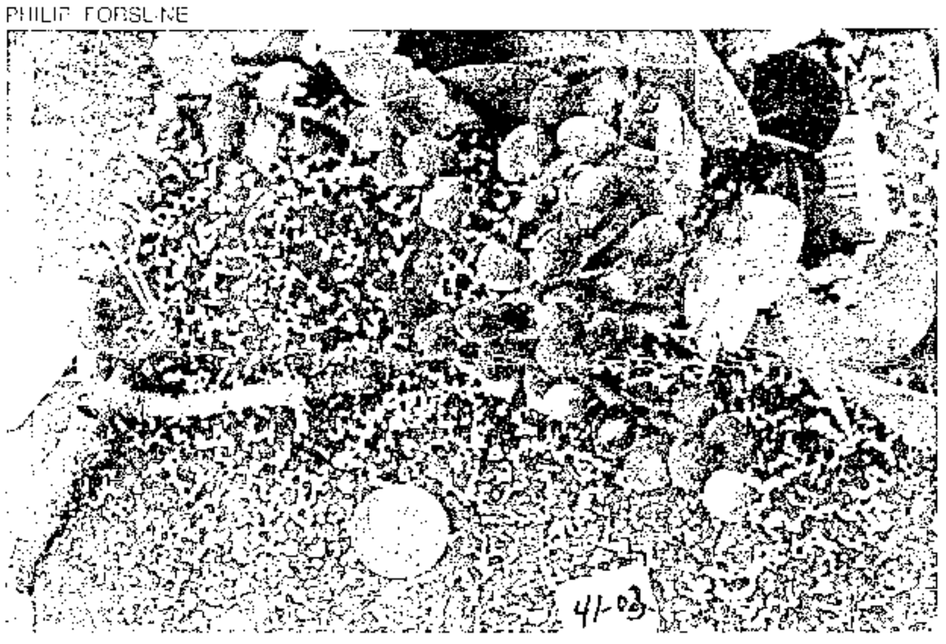
The 1989 and 1993 trips probably wouldn't have come about if not for the initial contact between Aldwinckle and Aimak Djangaliev, a professor of Biological Sciences at the Academy of Sciences in Kazakhstan. The 80-year-old Djangaliev has studied the wild apples of Kazakhstan for much of his career and helped arrange the exploration trips. He also came to the United States in 1992 to study apples native to the United States.

Today the United States is one of the world's leading apple producers. In 1993, U.S. apple production was an estimated 10.7 million pounds. But only 4 of 35 known *Malus* species are indigenous to the United States, and the 4 are crabapple types that aren't suitable as eating apples.

PHILIP FORSLINE

Collected near Topolevka, Republic of Kazakhstan, this wild apple's superior taste and texture made it one of the highest quality specimens found.

PHILIP FORSLINE



A dry region near Boraldy in Kazakhstan yielded pistachio germplasm for the plant explorers.

Rather, the apples we eat today—Red Delicious, Golden Delicious, McIntosh, for example—and that make up the bulk of U.S. commercial production are fruit immigrants, spread over the last few centuries by people like John Chapman, the legendary "Johnny Appleseed."

Forsline says that ancient explorers traveled through the Kazakhstan region—nestled between China to the east and Russia to the north—along the silk trade routes. They transported not only silk from the Orient to Europe, but also apples. "This is one of the ways that apples are thought to have been spread to other parts of the world," he says.

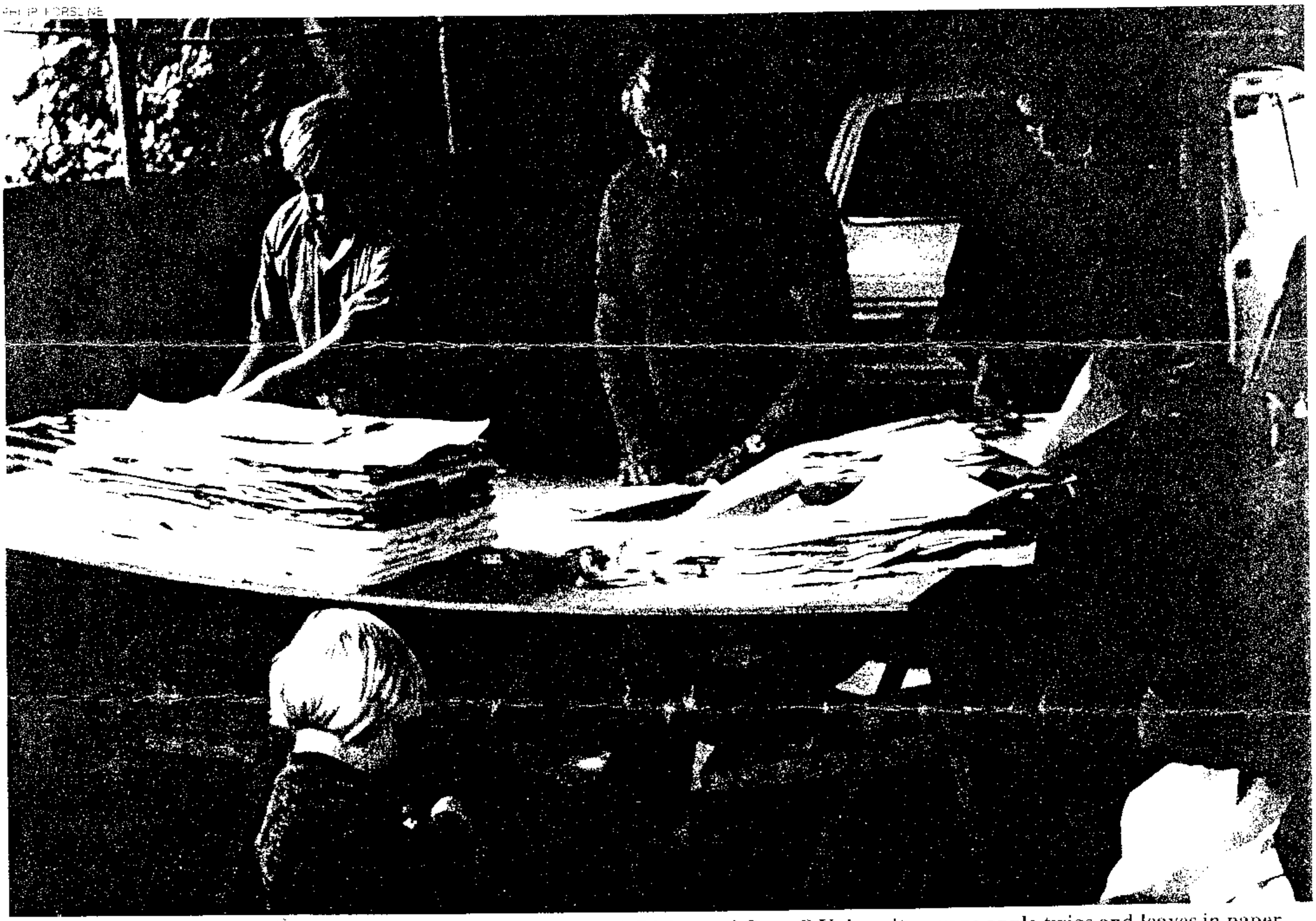
But Forsline and other researchers say that the traders who carried the apple seeds probably brought only a narrow genetic sampling with them. That could explain why domestic apples grown today in the United States have a fairly narrow genetic base, making them susceptible to scab and other diseases. The typical eating apple of today probably contains genes from only two or three of the known species, Forsline says. "In apple breeding, we've really only scratched the genetic surface, so to speak."

To broaden the apple's genetic base, scientists need to bring in new genes from those areas where apples evolved, for it is there they will find the greatest genetic diversity. And the more out of the way and remote the area, the better the chance of finding rare genes that have never been collected before.

Going off the beaten path had its challenges. Many of the remote mountain areas were accessible only by helicopter, hiking, or by taking a jeep down a dusty road for half a day. Sometimes, Forsline says, they were accompanied by aides carrying rifles to guard against a wild bear or boar that might happen to have its eye on the same apple tree.

On a typical day, the scientists collected between 500 and 1,000 apples. Often the apples were small—only about 1 to 2 inches in diameter—because of old age and environmental stresses such as drought and disease. But the fruit were a variety of colors, sizes, and apple shapes—and some, not surprisingly, looked nearly identical to the

PHILIP FORSLINE



Assisted by Leonid Butenok (center) and his son-in-law, Elizabeth Dickson of Cornell University wraps apple twigs and leaves in paper for shipment from Almaty, Kazakhstan, to the United States. Such herbarium specimens are used by taxonomists to identify different types of apples. Butenok furnished technical assistance during the collection trip.

popular varieties we buy in the local produce section.

"We saw some that looked like Golden Delicious, Red Delicious, and like the New Zealand variety Gala that is becoming popular," Forsline says. "You can see that the genetic base came from that area."

Evenings were spent extracting seed from the apples. This usually took place in a yurt, a circular tent made from animal hides and decorated with Persian rugs. The scientists and their hosts would score the apples around their perimeters, just below equator, and twist the two halves apart so they could extract undamaged seeds. Each apple yielded from 2 to 10, depending on its size and other factors.

When it was time for sleep, they slept in bunkhouses that were built years earlier for Khazakh Ministry of Forestry personnel and others exploring the fruit-filled mountains.

Forsline says there was a flurry of activity in the bunkhouses each night, as rodents scampered around, lured by the smell of the extracted seeds.

To increase the apple germplasm collection's diversity even further, Forsline wants to return to other areas of the region. Perhaps he will go in 1995 or 1996, as part of a 4-year follow-up project on apples with Kazakhstan funded by ARS and USDA's Foreign Agricultural Service. He says a trip to nearby China would also be helpful, since researchers believe the wild apples there may contain useful genetic material as well.

Meanwhile, apple-grower Wafler hopes the potential becomes reality. "This is the future of apples," he says.—By **Sean Adams,** ARS.

Philip L. Forsline is in the USDA-ARS Plant Genetics Resources Unit, Cornell University, Geneva, NY 14456; phone (315) 787-2390, fax (315) 787-2339. ◆