of Chiquián on the way to Tallenga, on very wet rocks, 3260 m, 10°06′00″ S, 77°09′28″ W, 8 May 2006, *P. Carrillo Reyes & M. Chocce 5177* (USM 210,321).

This species was collected by Weberbauer at the same time and locality as *Echeveria eurychlamys*. It was described initially as *Cotyledon imbricata* by Diels in 1906. After being transferred to *Altamiranoa* and to *Villadia*, the last combination proved to be illegitimate because of *Villadia imbricata*, published by Rose in 1903. Therefore Jacobsen renamed it *Villadia reniforme* in 1958. Finally in 1999 Thiede and 't Hart renamed it *Sedum reniforme* because of the previously published *Sedum imbricatum* by Walpers.

This species is unique among those included in this paper for its relatively wide leaves. However, we could not find any leaves that are broader than long as Thiede (2003) states, although some leaves are definitely reniform (kidney-shaped). After finding the type locality, we confirmed that this is the same species found much farther to the south in the departments of La Libertad and Ancash, where it is relatively more abundant (Fig 41).

In the present paper it is clear that the true *Sedum reniforme* from the type locality and the province of Cajamarca, as well as the specimens from the department of Ancash, have large, white, recurving petals (Fig 42). Diels' original description mentions "viridulo alba" (greenish white) petals. Many similar plants with no exact location have been grown in the USA and Europe and match the description but have clearly yellowish, greenish, or brownish flowers with shorter petals. Moreover, similar plants found by Nelson Cieza near the Río Marañón close to the border of Cajamarca with the departments of La Libertad and Amazonas have smaller, reddish flowers (RRP 432). *Sedum grandyi* Hamet is a species described from Chachapoyas, Amazonas at "el Caño de Santa Lucía," a disturbed locality where we searched exhaustively without success. On herbarium sheets *S. grandyi* is exactly like *S. reniforme* except for the brick color of the dried flowers. None of the descriptions of *S. grandyi* mention the color of the flowers. Future studies in the departments of La Libertad and Amazonas have to be made to see if these similar taxa with non-white flowers belong to new undescribed species, to *S. grandyi*, or to new varieties of *S. reniforme*.

James E Low (2006) of California published several articles about these closely related taxa, of which only *S. reniforme* has been discussed in detail. All of those mentioned above, plus *Sedum andinum*, a species from far south of Lima (Pino 2006), share two basic features: (1) widely oval to orbicular, bead-like leaves, often crowded along the stems, mostly dull green, reddish in the sun; and (2) the inflorescence is a cyme of two-forked branches, with light-colored petals often marked with red. Low thought all these should be included in a group for which he proposes the name "*Sedum andinum* complex," based on the best-known species, which is the smallest of this group. As soon as *Sedum grandyi* and the new taxa are clearly defined, this group could be formally established.

7. *Villadia klopfensteinii* Pino & Cieza sp. nov.

Planta succulenta glabra, florens usque ad 28–35 cm alta. Caulis procumbens fuscus 2.5–5 mm diam, 1–6 ramis erectis, sterilibus 1.7–5 cm longi, florigeris usque ad 35 cm, caulibus 2.5–3.5 mm diam flavovirentibus. Folia succulenta sessilia spiraliter disposita, infima confertim inserta, suprema erecta laxe dispersa, anguste ovata vel oblonga 1.3–1.8 cm longa, 4–5 mm lata, subacuta, flavovirentia, calcari hyalino instructa. Inflorescentia terminalis spica *4–11 cm longa, 16–34 floribus sessilibus. Bracteae ovatae, 6–7 mm longae 2–2.5 mm latae, in quoque flore ternae, angulo fere recto divergentes. Sepala triangularia-oblonga 3–6 mm longa 1.3–1.5 mm lata. Petala oblonga acuta 5.5–6 mm longa, 2.5–3 mm lata, a basi usque ad apicem coalita, flavovirentia. Stamina filamentis albis. Carpela 5 fusiformia albovirentia. Floret ab Aprile ad Majum.*

Holotype: Dept. Cajamarca, Prov. Celendín, Dist. Sucre, on road to Celendín, 33 km east of Cajamarca, 5 km west of Encañada, 3190 m, 16 May 1964, *P. C. Hutchison & J. Kenneth Wright 5117* (UCB 1410,141); F 1793,301, K (isotypes).

A succulent glabrous herb 28–35 cm tall when flowering. Roots 3–5 cm long, 1–1.8 mm diam, whitish. Stem procumbent, 2.5–5 mm diam, gray-brownish, branching every 2–6 cm (Fig 43). Branches 1–6 (–10), erect, vegetative shoots 1.7–5 cm long (Fig 44), flowering shoots up to 35 cm, stem 2.5–3 (–3.5) mm diam, light green-yellowish, rarely reddish. Leaves succulent, sessile, spirally arranged; crowded near the base, spreading and recurved inwards in young shoots, more widely spaced and erect in the distal ⅘, narrowly ovate to narrowly oblong, (0.9–) 1.3–1.8 (–2.4) cm long, (3.5–) 4–5 mm wide, 2–2.5 mm thick, obtuse-subacute, upper (inner) side convex

Figures 43–50. ***Villadia klopfensteinii.*** **Figure 43.** *V. klopfensteinii ex situ* from San Isidro. **Figure 44.** Young vegetative shoots of *V. klopfensteinii*. **Figure 45.** Detail of the leaves of *V. klopfensteinii* **Figure 46.** Spike of *V. klopfensteinii* in habitat. **Figure 47.** Detail of (left to right) bract lateral view, opposite bract, lateral bracts (2), sepals (3), petal, flower, fruit. **Figure 48.** *V. klopfensteinii* in habitat at Río Seco, spike several times larger than the plant. **Figure 49.** *V. klopfensteinii* in the dry season. Plants with small rosettes and dried spikes could be mistaken for *Echeveria* when not observed carefully. **Figure 50.** Young plant of *V. klopfensteinii* in habitat.

to flat, lower (outer) side convex, obscurely keeled, spurred at base, dull green-yellowish, rarely purplish with yellowish dots, margins entire (Fig 45).

Inflorescence a terminal spike 4–11 cm long (Fig 46). Flowers (12–) 16–34, appearing from April to May. Bracteoles three per flower, upcurved, the largest opposite the stem and the other two lateral, placed at 90° one at each side, 6–7 (–10) mm long, 2–2.5 mm wide,

Figures 51–56. ***Villadia aureistella.*** **Figure 51.** *V. aureistella ex situ*, Cajabamba. **Figure 52.** Detail of leaves (left) and young shoot (right). **Figure 53.** Detail of spike of *V. aureistella*. The golden yellow flowers have strongly recurving petals, a unique character among the Peruvian species. **Figure 54.** (above, left to right) detail of, flower bud, flower showing bract disposition, flower section, fruit. (beneath, left to right) opposite bract, lateral bracts (2), sepals (2), petals, lateral view, outer side, inner side, gynoecium. **Figure 55.** *V. aureistella* in habitat growing on the rock walls around Cajabamba. **Figure 56.** Young *V. aureistella* at Liclic. It could easily be mistaken for *V. paniculata*.

narrowly ovate, subacute, inner side concave, outer side convex and sometimes with reddish dots, with a hyaline spur at base. Pedicels absent. Sepals deltoid to oblong, obtuse, 3–6 mm long, 1.3–1.8 mm wide, light green. Petals oblong, acute-deltoid at tip, united along margins, curved inwards, tips slightly spreading outwards, 5.5–6 mm long, 2.5–2.8 mm wide, outer surface convex, green-yellow, inner surface concave, light green, margins entire. Stamens ten, the five epipetalous 2.5–3.2 mm long, the antesepalous 3.5–4.2 mm long, filaments white, 0.4 mm diam Anthers deltoid-ovoid, 0.8 × 0.7 mm, yellow. Gynoecium ovoid,

3.2 × 4.8 mm. Carpels five, 2.5–3.5 mm long, light green. Style 0.6 mm diam, 0.8 mm long, green, stigma white. Nectary scales oblong-spathulate, 1–1.2 mm. Fruit a dehiscent capsule, 4 × 5.2 mm, dry carpels reddish (Fig 47). Seeds narrowly ovoid, 0.65–0.70 mm long, 0.25–0.35 mm diam, orange.

PERU. Dept. Cajamarca, Prov. Celendín, Dist. Celendín, canyon of Río Marañón above Balsas, 3–4 km below summit of the road to Celendín, 2950 m, 23 May 1964, *P. C. Hutchison & J. Kenneth Wright 5280* (USM 43,488). Prov. Cajamarca, Dist. Baños del Inca, Route to ex-Estate Sangal, towards Encañada, 3190 m, 07°04′46″ S, 78°23′55″ W, 2 Apr 2002, *I. Sánchez-Vega 11355* (CPUN 15470). Dist. Encañada, near Encañada, on rocks, 2870 m, 4 May 1970, *A. Sagástegui 7384* (US 2588,359). Road from Encañada to Celendín, 1 km before Quinuamayo, growing with *P. nivalis* forma *diminuta*, 3410 m, 07°03′14″ S, 78°19′44″ W, 30 Apr 2000, *G. Pino 269* (USM 217,137). Prov. San Marcos, Dist. Gregorio Pita: road from San Isidro to Casablanca, on rocks, 7°14′38″ S, 78°00′33″ W, 3660 m, 15 May 2003, *G. Pino 1147*. Río Seco, 7°13′09″ S, 78°12′07″ W, 3097 m, 17 May 2002, *RRP 388*. (USM 217,138) (Fig 45). Ullillín, 7°15′47″ S, 78°08′03″ W, 2924 m, 24 Jun 2001, *RRP 26*. Prov. San Pablo, Dist. Tumbadén: Ingatambo, west of the floodgate on grassy highland, 6°55′20″ S, 78°40′04″ W, 3240 m, 13 Mar 2002, *I. Sánchez-Vega and A. Miranda Leiva 11,318* (CPUN 15,431) Loc. Cit., 10.5 km from detour of the road Cajamarca-Hualgayoc, on rocky outcrops, 6°55′20″ S, 78°40′04″ W, 3450 m, 25 Feb 2004, *I. Sánchez-Vega and W. Díaz Miranda 12,554* (CPUN 17,987). Dept. La Libertad, Prov. Sánchez Carrión, Dist. Huamachuco, road to Cajabamba, between Sausacocha and Cajabamba, 7°41′ S, 78°01′ W, 3000 m, 15 Feb 1983, *D. N. Smith & R. Vásquez 3383* (USM 125,278).

This species was collected for the first time in Celendín by Hutchison in 1964, who never named it, and it was found again by the team of the Botanical Garden of San Marcos led by Olivier Klopfenstein while looking for new species of *Peperomia*. From a distance this plant looked to them like a miniature *Echeveria* with yellow flowers (Fig 48), a character that can be even more confusing in the dry period (Fig 49). Vegetative shoots emerge as rosettes (Fig 50), flowers with campanulate flowers with erect, stiff, adnate petals are born in terminal spikes of the flowering stems, which at first were thought to be lateral inflorescences. A closer look shows that vegetative and flowering branches emerge separately from the procumbent primary stem buried in moss. The plant is named for Olivier Klopfenstein, born in Switzerland, forester and amateur botanist who came to Peru to visit his wife's country and remained for many years. He is the founder of the Botanical Garden of San Marcos, a tireless researcher of Peruvian flora, and co-author of several species of *Peperomia*. This is a homage to all his work during his stay among us. We hope he will return someday to continue exploring our land.

8. *Villadia aureistella* Pino & Cieza sp. nov.

Planta succulenta glabra florens usque ad 28–30 cm alta. Caulis erectus, ad basim 6–10 mm diam, ramis erectis 1–6, 3–5 mm diam, griseobrunneis. Rami secundarii steriles 3–6 cm longi, florigeri usque ad 30 cm longi, caulibus 1.8–2 mm diam rubiginosis. Folia succulenta imbricata spiraliter disposita sessilia anguste ovata vel anguste oblonga 8.5–10 mm longa, 1.8–2.5 mm lata, subacuta, flavovirentia. Inflorescentia terminalis spica *4–8 cm longa, 16–32 floribus sessilibus. Bracteae anguste ovatae-oblongae, 5–8 mm longae 1.5–1.8 mm latae, in quoque flore ternae, angulo fere recto divergentes. Sepala anguste ovata vel triangularia 4–6 mm longa 1.5–1.8 mm lata. Petala oblonga acuta 7.5–8 mm longa, 2.2–2.6 mm lata, flava, a basi usque ad dimidiam vel ⅔ partem coalita, demum deltoidea extrorsum recurvata. Stamina filamentis albis. Carpela 5 fusiformia alba. Floret ab Majo ad Julium.*

Holotype: Dept. Cajamarca, Prov. Cajabamba, Dist. Cajabamba, outskirts of the city of Cajabamba, road from Cinco Esquinas to the waterfall of Cochecorral, on rock-walls along field-borders, growing with *Echinopsis pachanoi*, *Opuntia ficus-indica*, *Peperomia galioides*, *Opuntia exaltata* [*Austrocylindropuntia subulata* ssp *exaltata*], 7°36′30″ S, 78°02′35″ W, 2600 m, 29 Jul 2005, *RRP 810* (USM 217,136).

A succulent glabrous herb, 28–30 cm tall when flowering. Primary roots 3–6, 3.5–5 cm long, 2–2.5 mm diam, light brown, secondary roots numerous, 1–1.2 mm diam, 3–4 cm long. Stem decumbent, apices erect, 6–10 mm diam at base, gray-brownish, branching profusely. Primary branches 1–4 (–6), erect, 3–5 mm diam, up to 15 cm long (Fig 51). Secondary branches numerous, vegetative shoots (1–) 3–6 cm long, flowering shoots up to 30 cm long, stem 1.8–2 (–4.5) mm, reddish. Leaves succu-