Fragm. Flor. Geobot. **37**(1): 157–204, 1992

Genera and species of the subtribe Spiranthinae (Orchidaceae). 2. A revision of Schiedeella

DARIUSZ L. SZLACHETKO

SZLACHETKO, D. L. 1992. Genera and species of the subtribe Spiranthinae (Orchidaceae). 2. A revision of *Schiedeella*. *Fragmenta Floristica et Geobotanica* 37(1): 157–204. Kraków. PL ISSN 0015–931x.

ABSTRACT: A new taxonomic revision of the orchid genus *Schiedeella* Schlecht. is presented. Of 29 species which were given names in this genus, ten species are considered to be still residual in *Schiedeella.* The genus is divided into two subgenera, *Schiedeella* and *Schiedeellopsis* Szlach., the latter subsequently including the type section and section *Gemmorchis* Szlach. All species as well as infraspecific taxa are described and their distribution is mapped. Keys to subgenera and species are also given. Two new combinations, *Stenorrhynchos albovaginata* (Schweinf.) Szlach. and *S. densiflora* (Schweinf.) Szlach., are proposed. *Schiedeella dodii* Burns-Balogh is reduced to a synonym of *S. wercklei* (Schlecht.) Garay.

KEY WORDS: Angiospermae, Orchidaceae, *Schiedeella*, taxonomy, Central America

D. L. Szlachetko, Department of Plant Ecology and Nature Protection, Gdańsk University, Al. Marszałka Piłsudskiego 46, PL–81–378 Gdynia, Poland

INTRODUCTION

Orchids of the subtribe Spiranthinae are mainly terrestrial plants growing primarily in the intertropical zone of the New World. The first attempt to systematize the Spiranthinae by Schlechter was published in 1920. Two independent revisions of this subtribe by Garay and Burns-Balogh appeared in 1982. Different concepts of the genera, species and even the interpretation of original diagnoses are the reason for the essential diversities between the authors. The result was greater confusion. This situation induced florists to further apply out-of-date names and formulation of taxa. The greatest discussion and controversy in respect of the Spiranthinae concern the two genera, viz. *Deiregyne* Schlecht. and *Schiedeella* Schlecht. The first of these was revised by Burns-Balogh (1988), whereas the present paper deals with the genus *Schiedeella* in the broadest sense.

The purpose of the present paper is primarily to elucidate the systematic position of all species ever included in *Schiedeella.* As the whole subtribe Spiranthinae was little known and due to the numerous controversies which arose around the problems concerning the formulations of genera and species, particular attention was paid to detailed morphological and, as far as possible, anatomical studies.

It was also necessary to classify the genus *Deiregyne* according to type, as this is sometimes considered to be closely related to *Schiedeella*. Some species were sometimes treated as representatives of one or other genus. The confusion of this question results from Schlechter not having indicated the generitype.

The lack of any information as to the ecological requirements of the species studied prompted the author to collect and arrange the data on the subject in order. Due to the lack of papers on the geographic distribution of the species of *Schiedeella* and taxonomic changes, an initial attempt has been made to present their distribution.

MATERIALS AND METHODS

The results presented here are based mainly on study of herbarium materials. I adopted acronyms of herbaria after *Index Herbariorum* (Holmgren *et al.* 1990). Apart from this I studied specimens of many species preserved in FAA or 70% alcohol and originating from Kew, as well as the private collections of Dr. P. Burns-Balogh, Champaign, and Dr. C. J. Sheviak, Albany. Altogether I studied about 600 specimens. The majority has been included in the list after description of each species. I traced back to type specimens, otherwise photographs or drawings of all species, collected original diagnoses of taxa studied, coloured photographs and slides of species and their habitats.

Due to insufficient knowledge of the Spiranthinae and confusion in their systematics, I have placed considerable stress on clarity and univocality of the morphological descriptions of species studied. For this purpose, from each specimen studied I prepared a flower which, after maceration was studied in detail under a stereomicroscope, measured, described and the various elements drawn. To ascertain differences in size of particular segments of the perianth and their possible variability in one plant, as far as possible I took one flower each from the base and apex of the inflorescence.

I prepared about 200 gentian stained microcuttings from flowers preserved in FAA or alcohol, and photographic documentation for the majority.

Data on the ecological requirements and phenology of species are taken mainly from the labels, as well as from the works of Ames and Correll (1952), Luer (1975) and McVaugh (1985). Distributional data are taken from the labels, the above-mentioned papers and Williams (1951), and served to draw up the maps. As Central America has not yet been well studied floristically, it will probably be necessary to add to the maps with the influx of the recent data.

HISTORY OF *SCHIEDEELLA* AND *DEIREGYNE*

The turning point in studies on the systematizing of the subtribe Spiranthinae was 1920, the date of the publication of the revision of this group by Schlechter. This author adopted uniform criteria for defining genera, assuming the most important to be the structure of the gynostemium and perianth morphology. He recognized 24 genera, of which 16 were new for science, amongst other things *Deiregyne* and *Schiedeella*, and additionally specified the concept of such previously known genera as *Spiranthes* L. C. Rich., *Pelexia* Poit. *ex* Lindl., *Sarcoglottis* Presl, *Cyclopogon* Presl and others. Unfortunately, Schlechter (1920) did not indicate type species for many of the new genera. This is now one of the reasons for the differences of opinions between scientists working on this group.

Schlechter's (1920) revision has not been accepted by American orchidologists. Ames

(1922) tried to demonstrate the inappropriate choice of the criteria adopted by Schlechter when isolating the genera. It was most probably partly thanks to him that Williams (1951) and D. S. Correll (Ames & Correll 1952) rejected the Schlechter's system. Hence, the majority, if not all, of the species of this subtribe described in the '30s and '40s, based mainly on the materials collected by E. Oestlund, were ranked among the genus *Spiranthes* in its widest sense. This state lasted until 1980, when Burns-Balogh completed her dissertation "Systematic studies of the subtribe Spiranthinae". This constituted the basis for the "Generic redefinition in the subtribe Spiranthinae" published two years later (Burns-Balogh 1982), although some nomenclatural novelties presented in this work were published separately (Balogh 1981). Due to an oversight on the part of the author, or the fault of the publisher, this paper contains certain inaccuracies, ascribing to Williams description of *Spiranthes nagelii* and *S. chartacea* as species of the genus *Schiedeella*. Of eight species proposed by Schlechter (1920), Burns-Balogh (1982, 1986) deleted from *Schiedeella* two species, *S. pyramidalis* Lindl. and *S. cobanensis* Schlecht. (she treated the two together), whereas she classified here 18 species, most of which were described after the death of Schlechter in 1925. Thus, Burns-Balogh designated *Spiranthes saltensis* Ames (=*S. durangensis* Ames & Schweinf.) as the type species of the genus as, in her opinion, it was the only species for which Schlechter was able to study both floral and vegetative material.

In 1982 (67 days before Burns-Balogh's paper), a revision of the subtribe Spiranthinae carried out by Garay, appeared. He distinguished 44 genera, 14 of which were new. He noted simultaneously, that Schlechter had made certain suggestions as regards the type of the genus *Schiedeella,* proposing S. *transversalis* A. Rich. & Gal. Agreeing with Garay (1982), Burns-Balogh (1986) stated that different lectotypification of the genus would not alter her concept. She treated S. *transversalis* as one of the species of *Schiedeella*. Garay left only two of the original species of *Schiedeella* within the genus, and added four others (Tab. 1). On the other hand, he divided the remaining species incorporated into *Schiedeella* by Burns-Balogh (1982, 1986) between such genera as: *Dithyridanthus* Garay, *Funkiella* Schlecht., *Gularia* Garay, *Microthelys* Garay, *Physogyne* Garay, *Stenorrhynchos* L. C. Rich. *ex* Spreng. and the majority – *Deiregyne*.

Like *Schiedeella*, *Deiregyne* was described by Schlechter in 1920 and initially embraced eight species. Burns-Balogh (1982, 1986) adopted *Spiranthes hemichrea* Lindl. as the type species of the genus in which five of the originally proposed species remained, adding a further five. Of Schlechter's species, Garay (1982) left only one – *S. chloraeformis* A. Rich. & Gal. – simultaneously choosing it as the generitype. Apart from this, almost all the species of section *Eriophora* of the genus *Schiedeella* sensu Burns-Balogh were included, as well as three others. Altogether, *Deiregyne* as formulated by Garay numbers 15 species. The remainder proposed by Schlechter (1920) and partly by Burns-Balogh (1982) became the basis for describing the new genera: *Gularia* and *Kionophyton* Garay.

Substantial divergencies in the formulations of both *Schiedeella* and *Deiregyne* exist between Burns-Balogh and Garay. To avoid confusion, many specialists continue to use the name *Spiranthes* for almost all species of the subtribe (e.g. McVaugh 1985). Which

Table 1. Generic placement of species which were given names under *Schiedeella* according to different authors.

Species	Schlechter (1920)	Burns-Balogh (1982)	Garay (1982)	Szlachetko (present paper)
albovaginata	–	*Schiedeella*	*Deiregyne*	*Stenorrhynchos*
amesiana	–	–	*Schiedeella*	*Schiedeella*
chartacea	–	*Schiedeella*	*Deiregyne*	*Oestlundorchis*
congestiflora	–	*Schiedeella/Funkiella*	*Funkiella*	*Svenkoeltzia*
dendroneura	–	*Schiedeella*	*Deiregyne*	*Schiedeella*
densiflora	–	*Schiedeella*	*Dithyridanthus*	*Stenorrhynchos*
diaphana	*Deiregyne*	*Schiedeella*	*Deiregyne*	*Burnsbaloghia*
durangensis	*Schiedeella*	*Schiedeella*	*Deiregyne*	*Funkiella*
eriophora	*Schiedeella*	*Schiedeella*	*Deiregyne*	*Oestlundorchis*
falcata	–	*Schiedeella*	*Deiregyne*	*Oestlundorchis*
fragrans	–	–	–	*Schiedeella*
hyemalis	*Funkiella*	*Schiedeella*	*Funkiella*	*Funkiella*
llaveana	*Schiedeella*	*Schiedeella*	*Schiedeella*	*Schiedeella*
michoacana	*Stenorrhynchos*	*Schiedeella*	*Stenorrhynchos*	*Stenorrhynchos*
muscifera	–	–	*Schiedeella/Stalkya*	*Stalkya*
nagelii	–	*Schiedeella*	*Schiedeella*	*Schiedeella*
obtecta	–	*Schiedeella*	*Deiregyne*	*Oestlundorchis*
pallens	–	–	–	*Oestlundorchis*
pandurata	–	–	*Deiregyne*	*Oestlundorchis*
“parasitica”	*Schiedeella*	*Schiedeella*	*Schiedeella*	*Schiedeella*
pseudopyramidalis	–	*Schiedeella*	*Deiregyne*	*Oestlundorchis*
pubicaulis	–	*Schiedeella*	*Lyroglossa*	*Lyroglossa*
pyramidalis	*Schiedeella*	*Deiregyne*	*Kionophyton*	*Deiregyne*
rubrocalosa	–	*Schiedeella*	*Microthelys*	*Galeottiella*
schlechteriana	–	–	–	*Schiedeella*
sheviakiana	–	–	–	*Oestlundorchis*
sparsiflora	–	*Schiedeella*	*Physogyne*	*Physogyne*
stolonifera	–	*Schiedeella*	*Funkiella*	*Funkiella*
tenella	–	*Schiedeella*	*Deiregyne*	*Funkiella*
trilineata	*Deiregyne*	*Schiedeella*	*Gularia*	*Schiedeella*
valerioi	–	–	–	*Schiedeella*
velata	*Schiedeella*	*Schiedeella*	*Deiregyne*	*Oestlundorchis*
violacea	*Cyclopogon*	*Cyclopogon*	*Schiedeella*	*Cyclopogon*
wercklei	*Spiranthes*	–	*Schiedeella*	*Schiedeella*

of the opinions presented – Burns-Balogh’s or Garay’s – is closest to Schlechter’s intentions? To answer this question, the original diagnoses of the two genera should be considered and confronted with the two concepts proposed.

GENERIC CONCEPT

The diagnosis and species included in *Schiedeella* by Schlechter (1920) clearly define his concept of this genus. According to him, *Schiedeella* can be characterized by *“(...) Label-*

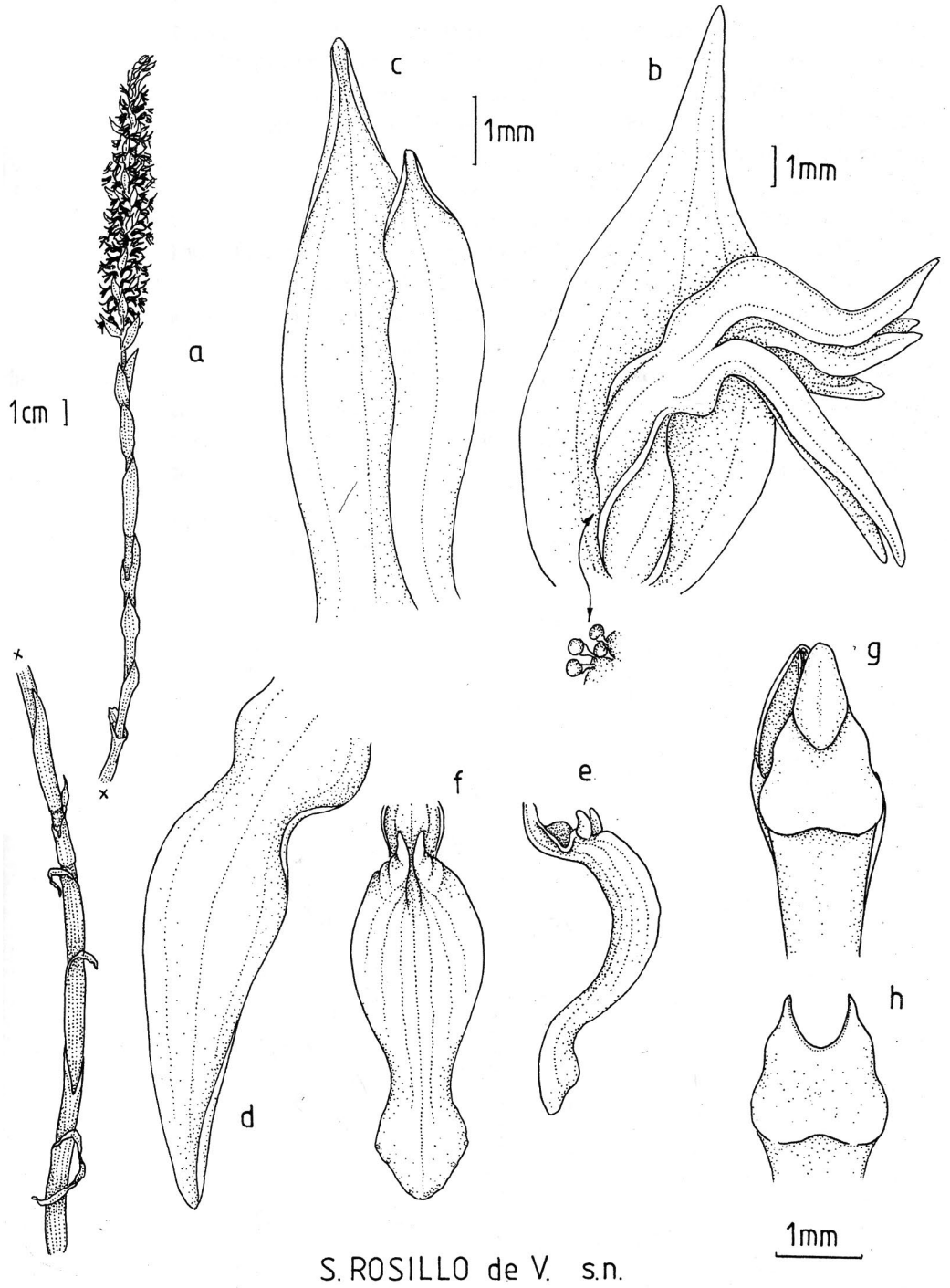

Fig. 1. *Deiregyne pyramidalis* (Lindl.) Burns-Balogh. a: habit; b: flower; c: galea; d: lateral sepal; e: lip, side view; f: lip, spread; g: gynostemium apex, rostellum with viscidium; h: rostellum remnant.

lum breviter sed distincte unguiculatum, (...) basi callis 2 paulo incrassatis, (...) pede brevi, (...) rostellum productum, tenue, obtusum (...) viscidio ovali, (...) in rostelli apice suspensa. (...) vaginis hyalinis vel mox desiccan libus plus minusve obtectis". Schlechter stated clearly that *Schiedeella* is closely related to *Cyclopogon*, differing from this in, among other things, the morphology of the lip. The flowers of the two genera are fairly similar, but on being studied in detail, distinct differences can be observed, particularly in the structure of the rostellum and viscidium.

At distinct variance with Schlechter's description is the structure of the rostellum and viscidium of *Schiedeella pyramidalis* (Figs 1–2). The remaining species fall into two distinct groups differing in the structure ofthe rostellum, perianth and bracts. To the first of these belong *S. transversalis* (=*S. llaveana* Lindl.), *"S. parasitica"* and *S. saltensis (S. durangensis)*, which boast a hard rostellum with narrow base, herbaceous floral and cauline bracts, and also reduced column foot. *S. llaveana* and *"S. parasitica"* have a lip on distinct claw with two fleshy auricles at the base, whereas *S. durangensis* has a sessile lip devoid of auricles, but with thickened edges of the base of the hypochile. The second

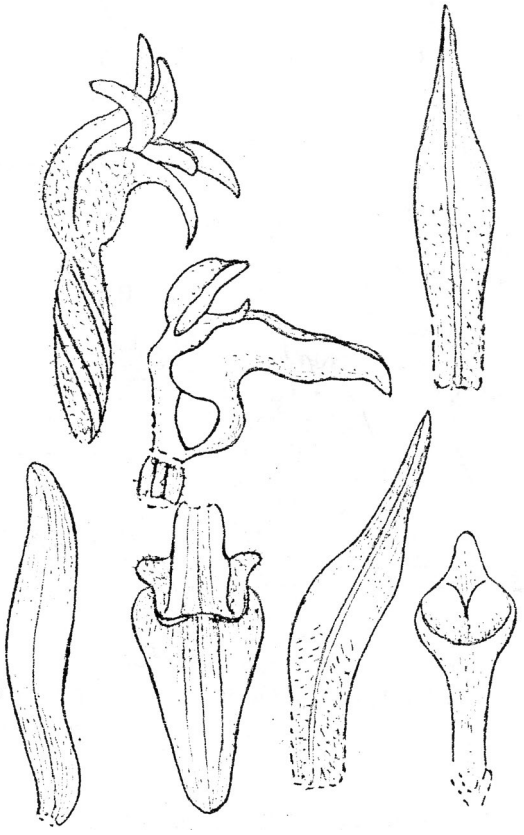

Fig. 2. Flower and floral parts of *Schiedeella pyramidalis* according to Schlechter (1931).

group embraces *S. eriophora* Rob. & Greenm. and *S. velata* Rob. & Fern. and is characterized by an arcuate gynostemium with a distinct foot, a soft rostellum with a wide base and lanceolate viscidium, as well as dry, scarious bracts. In this the claw gradually becomes transformed into a lip and is not so distinct as in *S. llaveana* and *"S. parasitica"*, neither does the lip have auricles. As can thus be seen, the diagnosis was written based on the two groups. This justifies Burns-Balogh's standpoint (1982, 1986), in which a substantial group of species related to *S. eriophora* and *S. velata* and described after 1925, was included in *Schiedeella*. This is influenced by both the species composition he proposed and the diagnosis. Whether a genus so understood remains a homogeneous taxon is a separate problem (Figs 3–4).

Garay (1982) assumed a different concept, incorporating into *Schiedeella* only species having a narrow based rostellum and lip set on a flat claw with auricles at the base of the hypochile. What is intriguing is why *Schiedeella* sensu Garay did not include *Spiranthes trilineata* Lindl. which, from the point of view of structure of the gynostemium and the

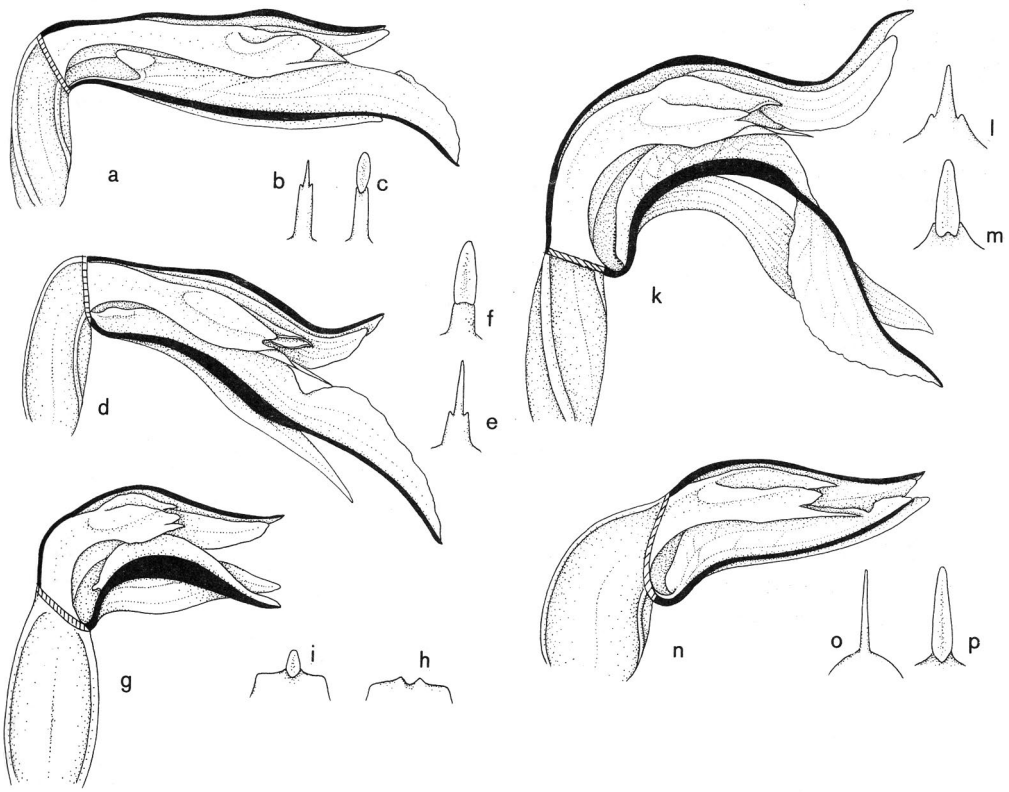

Fig. 3. Comparison of flowers and rostella between species placed in *Schiedeella* sensu Burns-Balogh. a–c: *Schiedeella llaveana* (Lindl.) Schlecht.; d–f: *Schiedeella (Funkiella) hyemalis* (A. Rich. & Gal.) Balogh; g–i: *Schiedeella (Galeottiella) rubrocalosa* (Rob. & Greenm.) Balogh; k–m: *Schiedeella (Oestlundorchis) eriophora* (Rob. & Greenm.) Schlecht.; n–p: *Schiedeella (Stenorrhynchos) albovaginata* (Schweinf.) Balogh. a, d, g, k, n: longitudinal section of flower; c, f, i, m, p: rostellum with viscidium; b, e, h, l, o: rostellum remnant.

perianth quite markedly suggests *Schiedeella nagelii* (L. O. Williams) Garay. Garay created a new genus *Gularia* for *S. trilineata* and *S. trilineata* var. *crenulata,* and excluded the group *S. eriophora*/*S. velata* from *Schiedeella* and treated them as a representatives of the genus *Deiregyne*.

According to Schlechter (1920), this genus is characterized by the presence of an elongated triangular or ligulate, blunt and narrow rostellum with oval viscidium suspended on a layer of cells below the apex, a straight column foot adherent to the ovary and ovary apex narrowing into a so-called neck. The shoots are covered with hyaline bracts. Schlechter noted that *Deiregyne* appeared to be most closely related to *Sarcoglottis*. As in *Schiedeella*, two groups can be distinguished, taking as the starting point the differences in structure of the rostellum and viscidium. Characteristic of the first is the nodular viscidium, notched rostellum remnant, distinct ovary neck and spur adherent to it (*Deiregyne* sensu Burns-Balogh). The second group includes species with semi-sheathed viscidium, subulate rostellum remnant, and greatly reduced column foot, similar to the cuniculus type of the spur and the lack of the ovary neck (*S. chloraeformis* and *S. trilineata*). The distinct heterogeneity of the genus suggests that Schlechter lacked good comparative material and either made a mistake or overlooked the differences between the group. As only the first group corresponds to the diagnosis, the indicating of the lectotype among these species is justified. Burns-Balogh did so, choosing *S. hemichrea* Lindl. as the lectotype (Fig. 4). Garay (1982) proceeded differently, eliminating from *Deiregyne* sensu Schlechter, every species except *S. chloraeformis,* simultaneously adopting this as the genus type. There were three of the species known to Schlechter from the genus *Deiregyne* sensu Garay: *S. durangensis, S. eriophora* and *S. velata*, and thus included by Schlechter himself among the *Schiedeella*. In my opinion Garay's procedure is erroneous (Szlachetko, in prep.). *S. chloraeformis* has a greatly reduced foot, which does not adhere to the ovary and in effect, the spur also has a different character. The essential feature of *Deiregyne* to which Schlechter turned his attention is the so-called ovary neck. This is particularly clearly visible in species with long column foot. As *S. chloraeformis* has no foot, the neck is invisible. Burns-Balogh's (1986) studies demonstrated that with the exception of *S. chloraeformis* and *S. trilineata,* the rostellum is bluntly truncated and after the removal of the viscidium shallow, sinuated in all species included in *Deiregyne* by Schlechter. In *S. chloraeformis* and *S. trilineata* it is subulate and pointed. Why Garay, having chosen *S. chloraeformis* as the lectotype, included such species as *S. eriophora, S. durangensis, S. dendroneura* Sheviak & Bye or *S. albovaginata* Schweinf., despite the essential differences in the structure of the gynostemium and lip.

Summing up, despite the priority of the lectotype of *Deiregyne* proposed by Garay (1982) it should be rejected, as this is evidently in the conflict with the protologue (Greuter 1988). The concept of the genus presented by Burns-Balogh (1982, 1986) would seem to conform with Schlechter's opinion and deserve acceptance. Thus, the group *S. eriophora* cannot be treated as a representative of *Deiregyne.* I previously drew attention to the differences between these species and *Schiedeella sensu stricto.* The

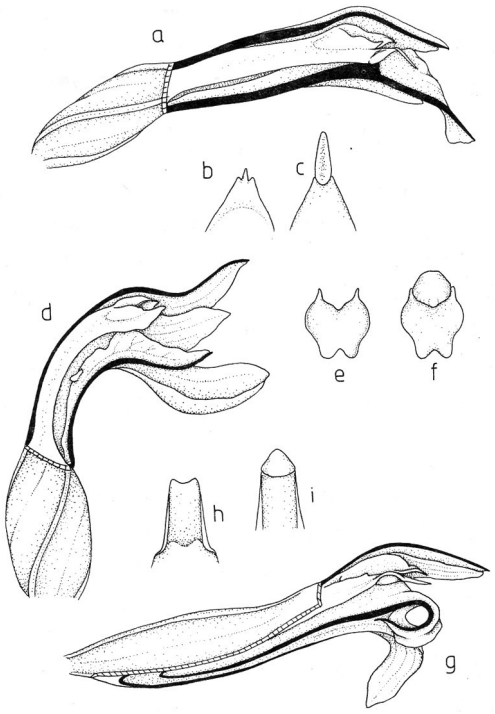

Fig. 4. Comparison between two proposed lectotypes of *Deiregyne* and *Sarcoglottis.* a–c: *Spiranthes chloraeformis* A. Rich. & Gal.; d–f: *Spiranthes hemichrea* Lindl.; g–i: *Sarcoglottis acaulis* (J. E. Sm.) Schlecht. a, d, g: longitudinal section of flower; c, f, i: rostellum with viscidium; b, e, h: rostellum remnant.

question therefore arises as to the taxonomic rank of this group. I think it would be most appropriate to describe it as a new genus – *Oestlundorchis* (Szlachetko 1991a).

TAXONOMY

Schiedeella Schlecht., Beih. Bot. Centralbl. **37**(2): 379. 1920. Type: *Schiedeella transversalis* (A. Rich. & Gal.) Schlecht. (*Spiranthes transversalis* A. Rich. & Gal.).

Gularia Garay, Bot. Mus. Leafl. Harv. Univ. **28**(4): 321–322. 1982, *syn. nov.* Type: *Gularia trilineata* (Lindl.) Garay (*Spiranthes trilineata* Lindl.).

Stem slender, rather delicate, covered by herbaceous cauline bracts. Bracts usually few, the middle and upper ones shorter than internodes. Leaves usually absent during blooming, forming a rosette near the base of stem, petiolate. Petiole narrow, blade broadly lanceolate to cordate-ovate. Floral bracts herbaceous, usually twice as long as ovary. Flowers tiny or small, horizontal or erect, tubular, only at the apex more or less opened. Ovary erect or curved only near the apex. Lip usually set on distinct claw, divided into the epichile and hypochile. In the base of hypochile more or less distinct, fleshy auricles. Gynostemium erect or suberect, slender. Column foot reduced. Rostellum linear with narrow

base. Viscidium suspended in the top of the rostellum, oval, apical or basal. Rostellum remnant more or less 3-dentate, with distinctly longer middle tooth. Anther cordate-ovate.

Etymology – The genus named after C. J. W. Schiede (1798–1836), a German naturalist and collector of Mexican plants.

Note – The genus *Gularia* was established to accommodate *Spiranthes trilineata* and S. *trilineata* var. *crenulata.* According to Garay (1982) it differs from *Schiedeella* in the presence of a long, decurrent column foot, a pliable rostellum and claw fused with the lateral sepals. In my opinion, the column foot of *S. trilineata* is not longer than in other species of *Schiedeella.* Studies of herbarium specimens have shown that the rostellum of this species is similar in texture to that of, for example *S. llaveana*. The fusion of the claw with the lateral sepals is present in various species of *Schiedeella.* In view of the lack of essential morphological conditions distinguishing the genus *Gularia,* I propose it be included in *Schiedeella.*

Burns-Balogh (1986) published the infrageneric classification of *Schiedeella*, distinguishing the sections of *Schiedeella, Parasitica, Eriophora* and *Michoacana*. The basis for this division is the type of floral bracts, colour of flowers and nectaries, and morphology of the lip. The reason for discarding this, is its unsuitability in the generic concept proposed here.

Basing on the structure of the gynostemium, cauline and floral bracts, the genus *Schiedeella* can be divided into two subgenera in accordance with the following key (Fig. 5):

1. Rostellum slender, longer than half the stigma length, viscidium apical ..... subg. *Schiedeella*
1. Rostellum shorter than or as long as half of the stigma, viscidium basal ... subg. *Schiedeellopsis*

Subgenus *SCHIEDEELLA*

Rostellum linear, slender, long, with small, oval viscidium at the apex. Rostellum remnant 3-dentate, the middle tooth distinctly longer than laterals, sometimes lateral ones greatly reduced. Anther shorter than column.

The subgenus includes the following species: *Schiedeella llaveana* (Lindl.) Schlecht., *S. valerioi* (Ames & Schweinf.) Szlach. & Sheviak, *S. wercklei* (Schlecht.) Garay, *S. amesiana* Garay, *S. nagelii* (L. O. Williams) Garay and *S. trilineata* (Lindl.) Balogh.

KEY TO THE SPECIES (Fig. 5):

1. Flowers horizontal 2
1. Flowers erect 4

2. At the base of the lip two fleshy, finger-like auricles; lip distinctly longer than other perianth segments ..... *S. llaveana*
2. Auricles at the base of the lip reduced, not finger-like, indistinct; lip as long as the other perianth segments 3

3. Flowers glabrous or only at the ovary apex sparsely glandular; hypochile rectangle, side lobes indistinct; floral bracts glabrous. ..... *S. valerioi*
3. Flowers glandular; hypochile lyre-like, with two wings near the apex; floral bracts glandular .... *S. wercklei*

4. Auricles rounded; perianth as long as ovary ..... *S. amesiana*
4. Auricles finger-like; perianth distinctly longer than ovary 5
5. Leaves present during flowering; inflorescence lax, bent forward, 2–6-flowered, axis glandular ..... *S. nagelii*
5. Leaves absent during flowering; inflorescence dense, erect, usually 6–12-flowered, glabrous ..... *S. trilineata*

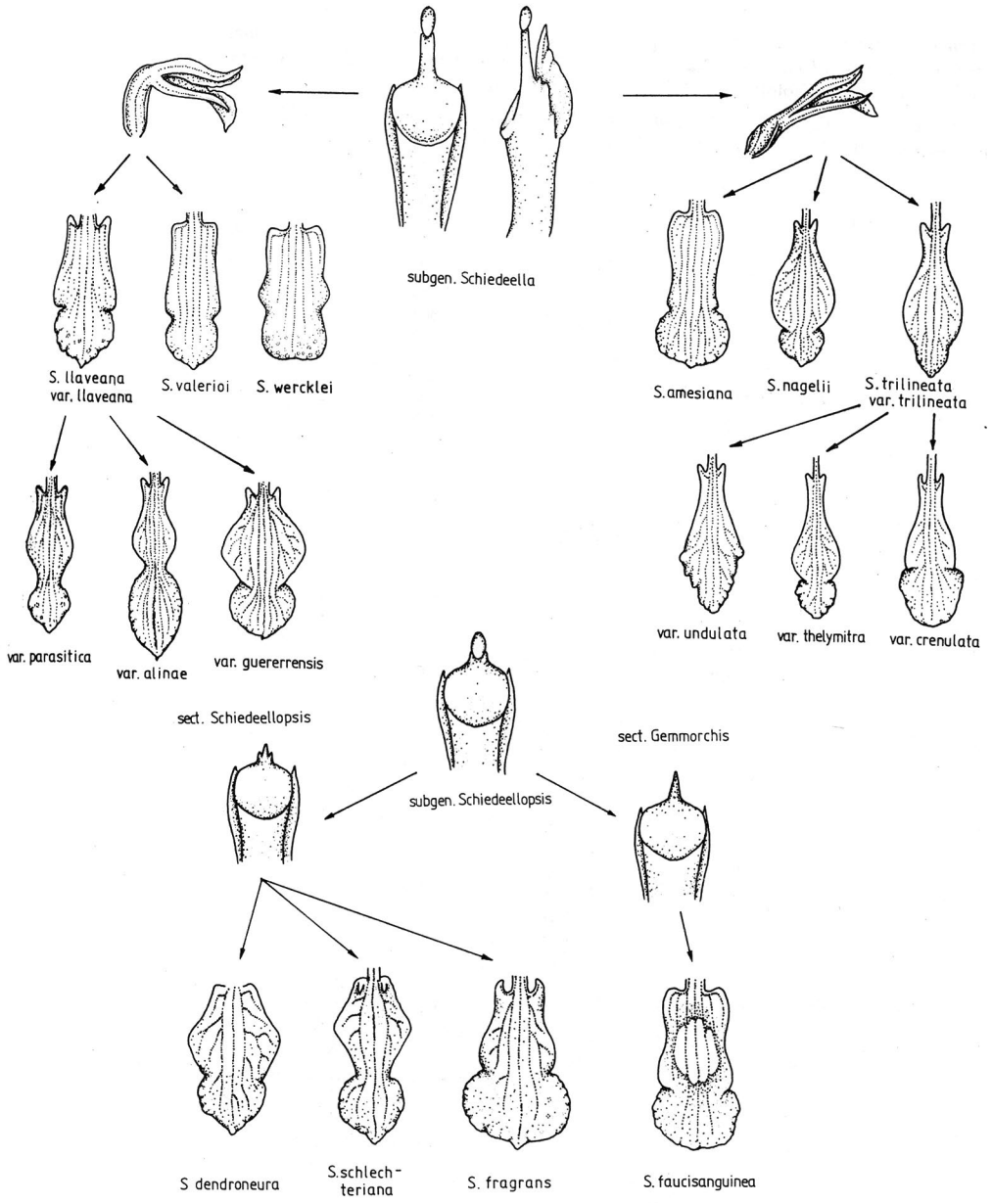

Fig. 5. An illustrated key to the genus *Schiedeella*.

Schiedeella llaveana (Lindl.) Schlecht. (Figs 6–11 & 13–15)

Beih. Bot. Centralbl. **37**(2): 380. 1920. – *Spiranthes llaveana* Lindl. *in* Benth., Pl. Hartw. 72. 1842. – *? Neottia micrantha* Llave & Lex., Nov. Veg. Descr. **2**: 5. 1825 (*non Spiranthes micrantha* Rodr.). – Type: Mexico, Totentepeque, 1839, *Hartweg s.n.* (Holotype: K-L! photo; isotype: K-B! – Fig. 6).

Spiranthes transversalis A. Rich. & Gal., Ann. Sci. Nat. Bot. Sér. 3, **3**: 32. 1845. – *Schiedeella transversalis* (A. Rich. & Gal.) Schlecht., Beih. Bot. Centralbl. **37**(2): 381. 1920. – Type: Mexico, Vera Cruz, Cordillera, 1840, *Galeotti 5193* (Holotype: P! – Fig. 7).

Spiranthes tuerckheimii Schlecht., Rep. Spec. Nov. Reg. Veg. **2**: 131. 1906. – *Cyclopogon tuerckheimii* (Schlecht.) Schlecht., Beih. Bot. Centralbl. **37**(2): 396. 1920. – Type: Guatemala, Dept. Baja Verapaz, Santa Rosa, April 1887, *von Tuerckheim 1169* (Holotype: US!; isotype: AMES! – Fig. 6) (see note).

Schiedeella petiolata Schlecht., Beitr. Orchid. Zentral-Am. **2**(2): 85–86. 1923. – Type: Costa Rica. Tablazo, March–April 1909, *A. & C. Brade 1134* (Holotype: B† – ?; isotype: HB! – photo).

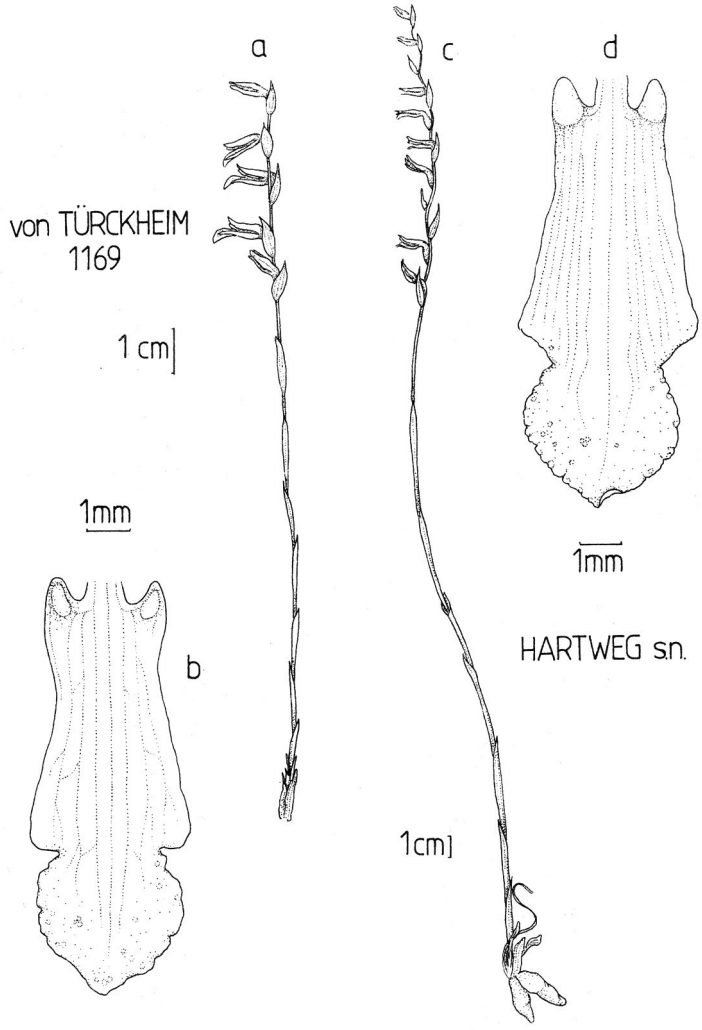

Fig. 6. *Schiedeella llaveana* (Lindl.) Schlecht. Comparison between the type specimens of *Spiranthes tuerckheimii* Schlecht. (a, b) and *S. llaveana* Lindl. (c, d). a, c: habit; b, d: lip.

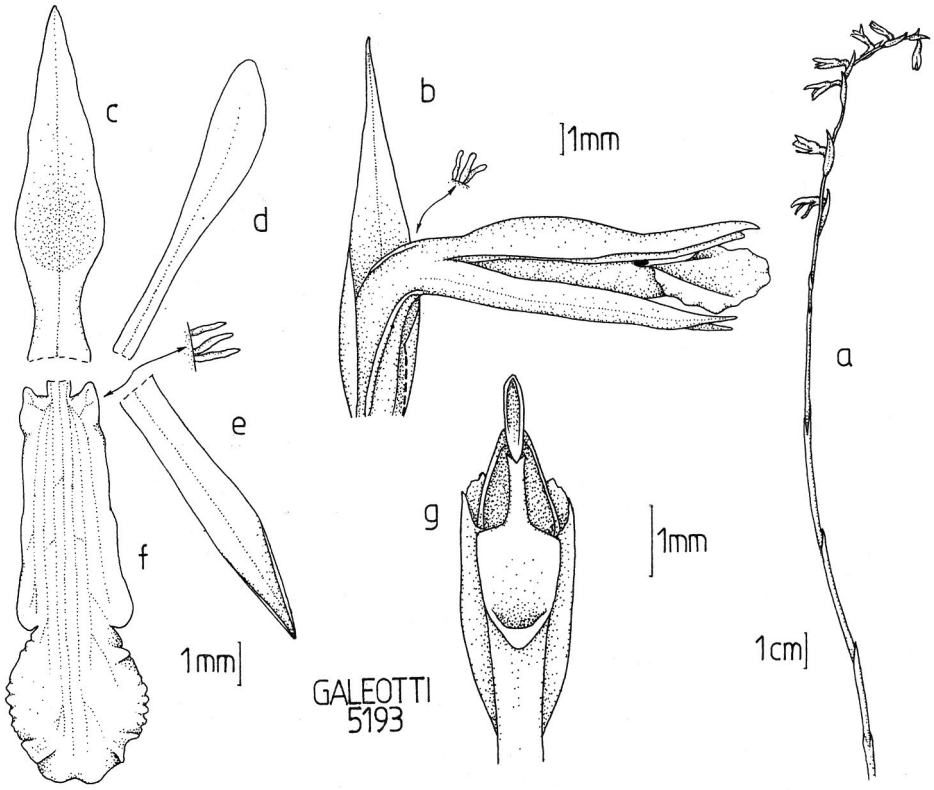

Fig. 7. *Schiedeella llaveana* (Lindl.) Schlecht. a: habit; b: flower; c: dorsal sepal; d: petal; e: lateral sepal; f: lip; g: gynostemium (drawn from holotype of *Spiranthes transversalis* A. Rich. & Gal. – P).

Roots 2–8, 10–48 mm long, 1.5–9.0 mm ∅, clustered, cylindrical, densely white pubescent. Stem 90–660 mm high, 1.5–4.0 mm ∅ at base, 0.5–2.0 mm ∅ under inflorescence, delicate, erect, glabrous. Cauline bracts 4–10, more or less adnate to the stem, acute, herbaceous; reddish, green or green with red nerves. Leaves 1–3, absent during blooming, at the base stem the rest of petioles only; petiole 15–185 mm long, narrow; blade 35–140 mm long, 5–38 mm wide, lanceolate, broadly lanceolate to oblong-elliptic, acute. Inflorescence 20–230 mm long, 4–30-flowered, lax, secund. Flowers small, tubular; perianth whitish, pink to red or green with yellow-pink apices; lip white with olive-brown, green, yellowish or red inside. Floral bracts 6–20 mm long, about 2 times longer than ovary, broadly lanceolate, acute, herbaceous, grey-green with 3 purple nerves, composed of 3 layers of cells, there being one layer on the edges only (Fig. 8). Ovary 3.5–10.0 mm long, cylindrical, glabrous or rarely glandular, numerous cells with raphides. Perianth segments with 2–4-layered mesophile, with distinct aerial canals and numerous raphides (Fig. 9). Dorsal sepal 4.2 –10.4 mm long, 2.0–2.4 mm wide, (1–)3-nerved, lanceolate, concave above the base, broadest near the middle, glabrous or sparsely glandular. Lateral sepals 3.8–9.0 mm long, 0.8–2.0 mm wide, 1(–2)-nerved, linear-lanceolate to slightly falcate, acute, glabrous or sparsely glandular at base, upper epidermis covered by subulate cuticules. Petals 4.1–9.5 mm long, 0.5–1.3 mm wide, 1-nerved, linear to narrow-spathulate, widest in upper part, rounded or obtuse at the apex, on outer margin near the apex minutely dentate; through common cuticule fused with dorsal sepal. Lip on distinct claw, usually divided into hypo- and epichile; in natural position boat-shaped with epichile erect or bent down.Hypochile 3.5–7.5 mm long, 1.9–5.0 mm wide, very variable in shape – from almost quadrate, oblong, lyre-like to rhombic, broadest near the apex or

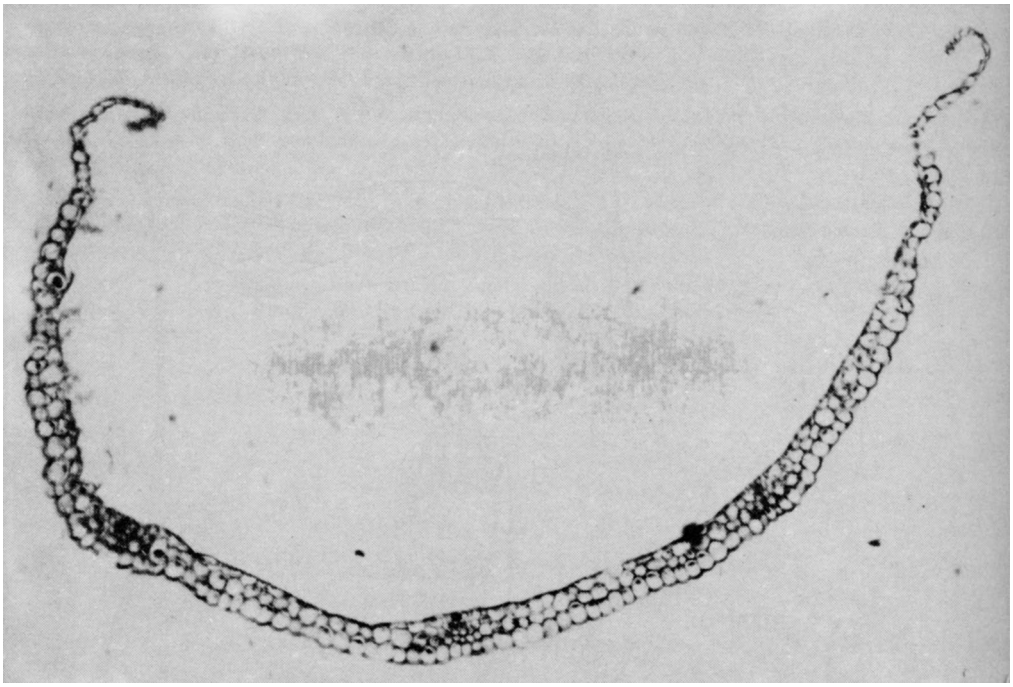

Fig. 8. Transverse section of bract of *Schiedeella llaveana* (x 60).

in the middle, with distinct, fleshy auricles at the base, pubescent in the central part, side lobes rounded or triangular; mesophile compact, with numerous raphides, upper epidermissulcate near the apex of hypochile. Isthmus acute to rounded, rarely lacking. Epichile 2.0–6.5 mm long, 1.9–4.3 mm wide, very variable in shape – from almost cordate, through elliptic to tongue-like, acute, obtuse or slightly notched, indented edges, with papillate upper epidermis. Gynostemium 4.5–8.0 mm long, erect, slender, below the stigma on ventral surface glandular, numerous raphides. Stigma covered with elongated, loose cells and viscous secretion, the whole surrounded with cuticule. Staminodes fused with the side lobes of hypochile through the common cuticule. Rostellum about 2 mm long, built of cells of lignified walls (Fig. 10). Viscidium 0.8–1.3 mm long, built of loose cells with partially mucous-covered walls, enclosed in epidermis. Rostellum remnant 0.7–1.2 mm long. Anther 1.0–3.6 mm long, cordate, connective several-layered. Pollinia soft and mealy, pollen grains 3-nucleate, in tetrads (Fig. 11). Fruit 5–10 mm long, with dry flower on the top.

Ecology – Dry or rocky slopes, sparsely covered by trees, grassy plains, llanos, mixed forests, under *Pinus sp.* and *Abies religiosa*; on loamy soils. Flowers in XI to IV.

Distribution – Montane species widespread from Mexico to Costa Rica at an elevation of 1000–3300 m, but most frequently at 1500–2500 m (Fig. 12).

Variability – The shape of the lip, size of the flowers and plants (Figs 13–14). I propose to distinguish the following four varieties, but their taxonomic value needs detailed biometric investigations.

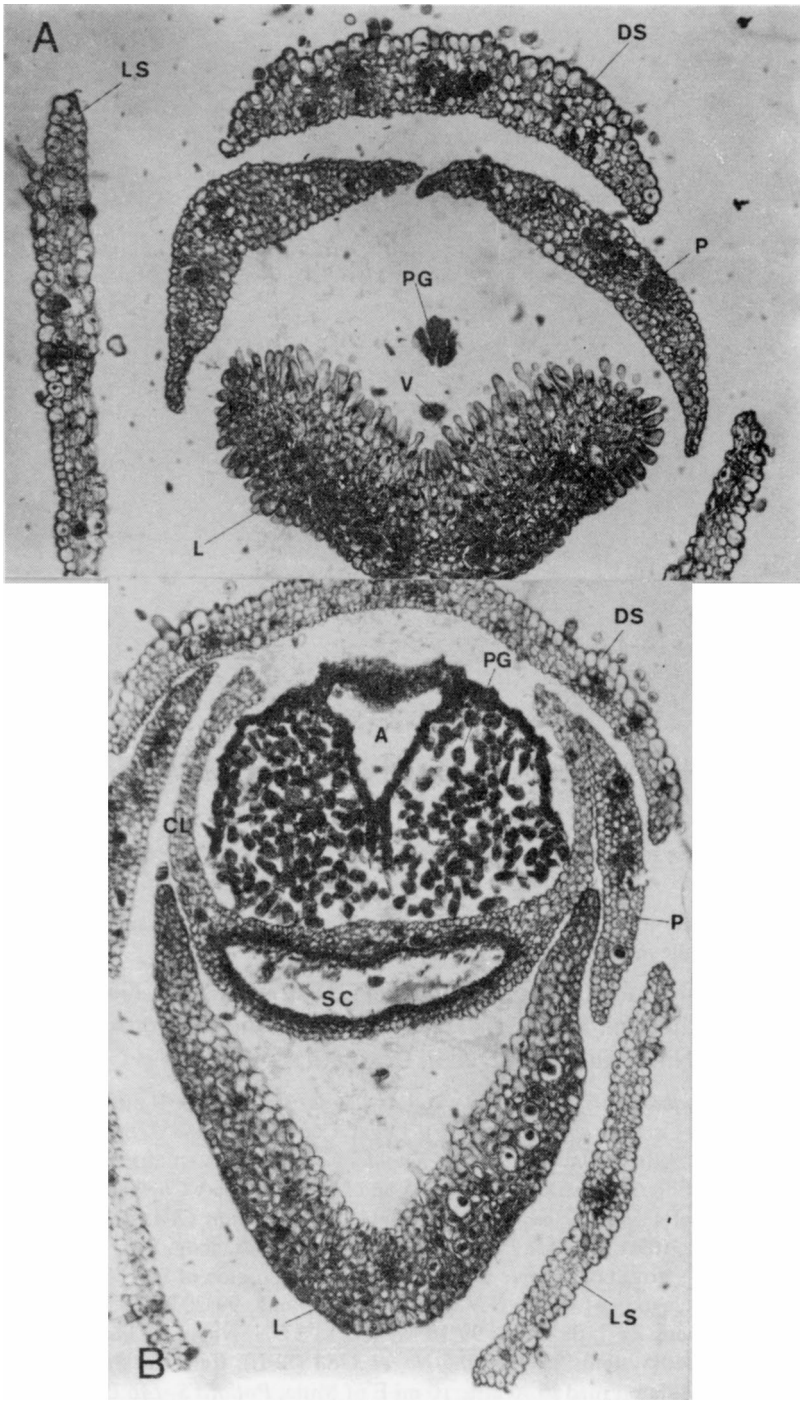

Fig. 9. Transverse section through apical (A: x 65) and middle (B: x 50) part of flower of *Schiedeella llaveana* (Lindl.) Schlecht. A: anther; CL: clinandrium; DS: dorsal sepal; L: lip; LS: lateral sepal; P: petal; PG: pollen grains; V: viscidium.

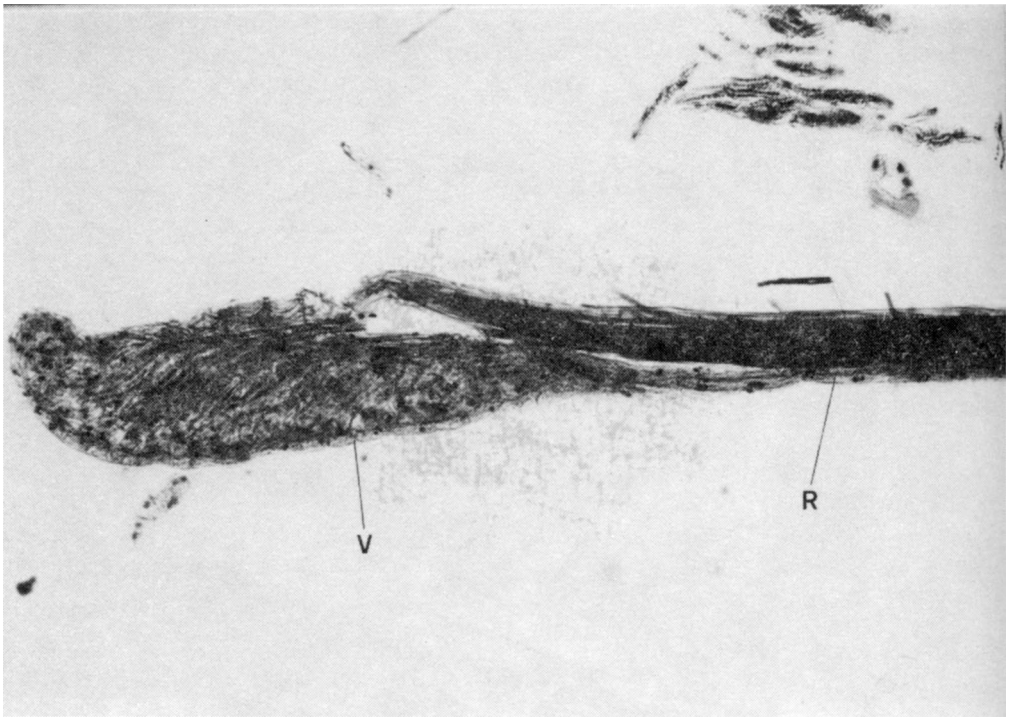

Fig. 10. Longitudinal section through rostellum and viscidium of *Schiedeella llaveana* (Lindl.) Schlecht. (x 150). R: rostellum; V: viscidium.

var. ***llaveana***

Hypochile quadrate to oblong, the broadest near the apex, side lobes small, acute. Isthmus acute. Hypochile and epichile more or less the same width.

Distribution – Mexico (Chiapas, Chihuahua, District Federal, Guerrero, Hidalgo, Jalisco, Mexico, Michoacan, Morelos, Oaxaca, Puebla, San Luis Potosi, Vera Cruz), Guatemala, Honduras, Nicaragua, El Salvador, Costa Rica.

Specimens examined – MEXICO. **CHIAPAS**. Los Lagos, 3 mi NW of Rancho San Jose, which is 34 mi SE of Comitan, *Carlson s.n. & 1735* (F); Lugar Cerro, *Longman 3783* (SEL); Chiapa, *Collins & Dogle 143* (US). **CHIHUAHUA**. Mojarachic, *Knoblock 5117* (SEL). **GUERRERO**. Mpio. Chichihualco, antre Los Morros y Filo de Caballo, *Espejo 2795* and *Lopez Ferrari y Chehaibar s.n.* (IEB). **HIDALGO**. Real del Monte, near Pachuca, long. 98º38'W, lat. 20º08'N, *Juan Gonzales 2178* (SEL); Trinidad, *Pringle 11915* (US). **MEXICO**. Near Puebla Nuevo, N of Toluca, long. 99º37'W, lat. 19º43'N, *Juan Gonzales 1453* (US). **MORELOS**. Above Barranca de la Canoa, region of Sta. Mana, Ahuacatixlan, *Sawyer 996* (SEL); near lagoon of Quila, NW of Cuernavaca, long. 99º20'W, lat. 19º4'N, *Juan Gonzales 2272* (US); near Puerte de Ixtla, long. 99º19'W, lat. 18º37'N, *Nagel* & *Juan Gonzales 3678* (US). **OAXACA**. Zamoaltepetl-system, S of Ayutla, *Nagel 3788* (SEL); Cerro de San Felipe, N of Oaxaca, *Camp 2602* (NY); Mitla on road to Ayutla, 10 mi E of Mitla, *Pollard S–146* (SEL). **PUEBLA**. Route de Cholula, vicinity of Puebla, *Arsene 898* (US). **SAN LUIS POTOSI**. Sine loco, *Schaffner 256* (US).

GUATEMALA. **BAJA VERAPAS**. Moist ravine slopes of Sierra de Chuacus, S of San Geronimo,

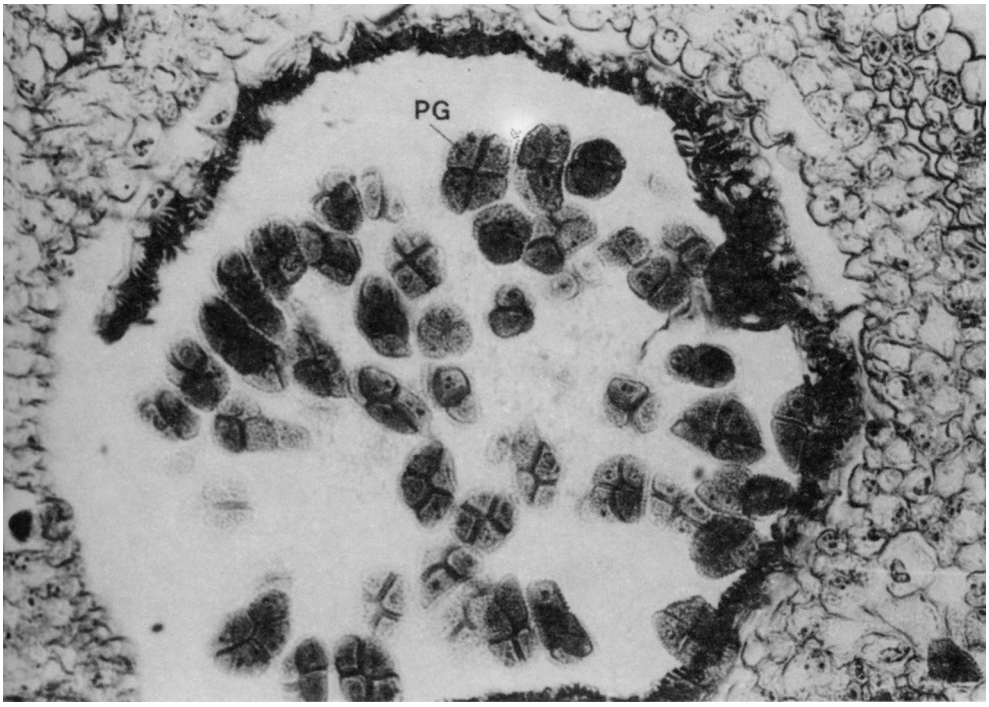

Fig. 11. Pollen grains (PG) of *Schiedeella llaveana* (Lindl.) Schlecht. (x 190).

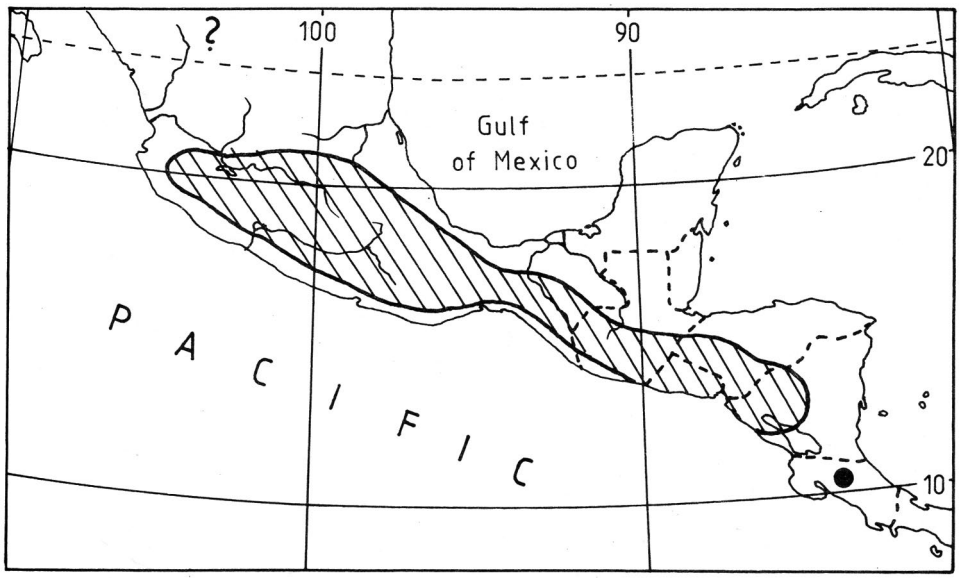

Fig. 12. Distribution map for *Schiedeella llaveana* (Lindl.) Schlecht.

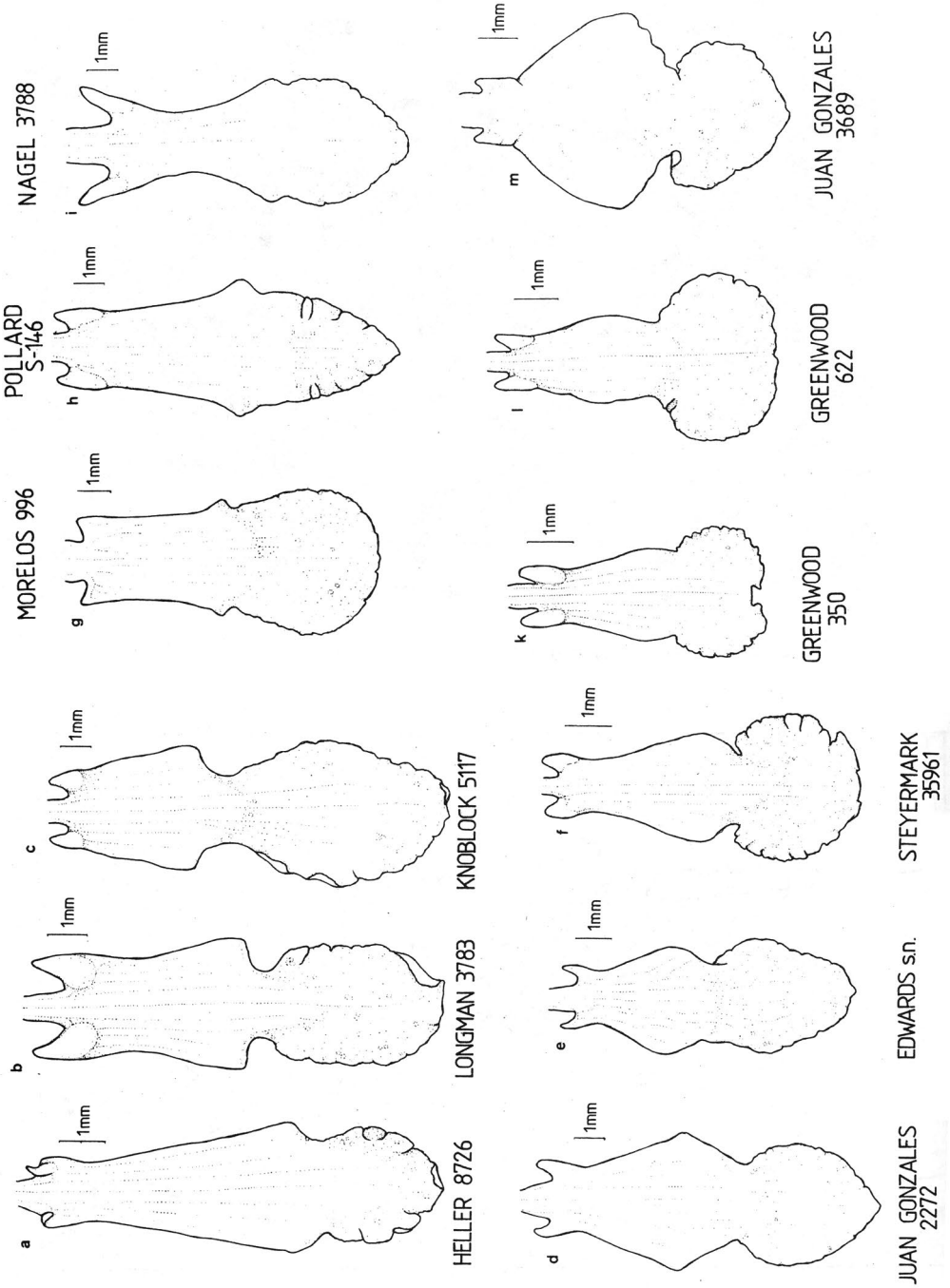

Fig. 13. Variability in the lip form in *Schiedeella llaveana* (Lindl.) Schlecht. (m: holotype of *S. llaveana* var. *guerrerensis* Szlach. – US).

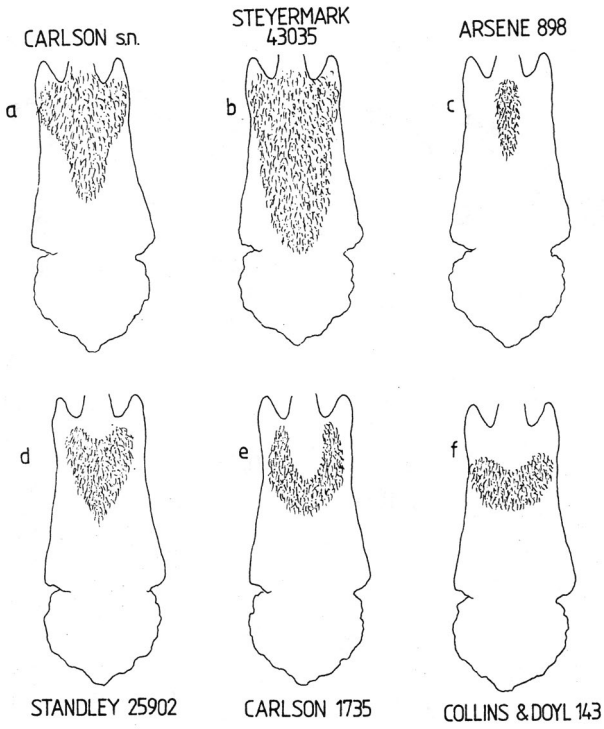

Fig. 14. Variability in the lip pubescence in *Schiedeella llaveana.*

Steyermark 43872 (F). **SAN MARCOS**. NW slope of volcan Tajumuho, barrancas 6 miles SW of town of Tajumuho, *Steyermark 36691* (F). **EL PROGRESSO**. Sierra da las Minas, between Calera and summit of volcan Siglo, *Steyermark 43035* (F). **ZANICHE**. Sacabaja, *Heyde* & *Lust 3514* (US).

EL SALVADOR. **CHALATENANGO**. Finca El Pital, Cerro El Pital, *Hamer 681* (F, MO). **SANTA ANA**. San Jose near Matapan, *Pohweder 3551* (MO). **SAN SALVADOR**. Crater of volcan de San Salvador, *Carlson 446* (F).

NICARAGUA. **JINOTEGA.** Along banks of highway N of Jinotega Rock Quarry, *Heller 8726* (SEL).

HONDURAS. **MORAZAN.** Piedra Herrada, *Standley 25902* (F);

var. ***parasitica*** (A. Rich. & Gal.) Szlach. (Fig. 15)

Fragm. Flor. Geobot. **36**(1) :14. 1991. – *Spiranthes parasitica* A. Rich. & Gal., Ann. Sci. Nat. Bot. Sér. 3, **3**: 32. 1845. – *Schiedeella parasitica* (A. Rich. & Gal.) Schlecht., Beih. Bot. Centralbl. **37**(2): 381. 1920. Type: Mexique, Chiapas, 1840, *Linden 1221* (Holotype: P!; isotypes: W-R!, G?).

Hypochile oblong-lyre-like, side lobes rounded. Isthmus rounded, rarely acute. Hypochile and epichile the same width.

Distribution – Mexico (Chiapas, Guerrero, Hidalgo, Mexico, Morelos, Oaxaca, Vera Cruz), Guatemala.

Specimens examined – MEXICO. **CHIAPAS**. San Felipe, village near Ciudad las Casas, San Cristobal, Mt. Ecatepec, 3 miles W of town, *Carlson 1601* (F); km 48, Carratera Huixtla – Motozintla, *Soto Arenas 1716* and *Salazar & Calvo s.n.* (AMO); km 90, Carratera San Cristobal – Comitan, *Soto Arenas 1624* and *Salazar* & *Calvo s.n.* (AMO). **HIDALGO**. N of Atotonilco el Grande, long. 98°51'W, lat.

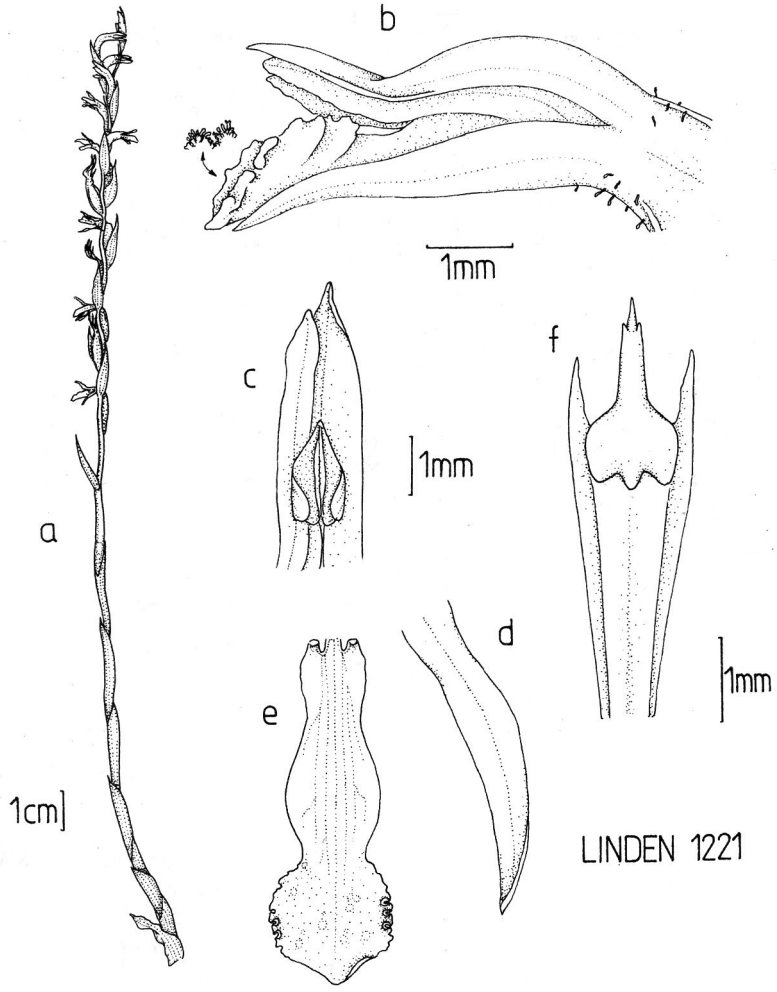

Fig. 15. *Schiedeella llaveana* (Lindl.) Schlecht. var. *parasitica* (A. Rich. & Gal.) Szlach. a: habit; b: flower; c: galea and anther; d: lateral sepal; e: lip; f: gynostemium, viscidium removed (drawn from holotype of *Spiranthes parasitica* A. Rich. & Gal. – P).

20º13'N, *Juan Gonzales 2190* (US); near reservoir road from Jutaneingo to Huauchinango, *Edwards s.n.* (NY). **MEXICO**. Distr. Temascaltepec, Cumbre – Gavia, *Hinton et al. 9001* (F, NY, US – 2). **MORELOS**. Near Totolapan, long. 98º55'W, lat. 18º59'N, *Juan Gonzales 2211* (US). **OAXACA**. N of Oaxaca town, Mt. San Felipe, long. 90º40'W, lat. 17º11'N, *Nagel 3730* (US). **VERA CRUZ**. La Joya, Mpio. Acajete, *F. Ventura A. 5203* (IEB).

GUATEMALA. **CHIAMALTENANGO**. Chichavac, *Skutch 325* (US). **SAN MARCOS**. Volcan Tacama, vicinity of Sibinal, *Steyermark 35961* (F).

var. ***guerrerensis*** Szlach. (Fig. 13m)

Fragm. Flor. Geobot. **36**(1): 14. 1991. Type: Mexico, Guerrero, mountains above Taxco towards Tenerias, 9 Mar 1934, *Juan Gonzales 3689* (Holotype: US!).

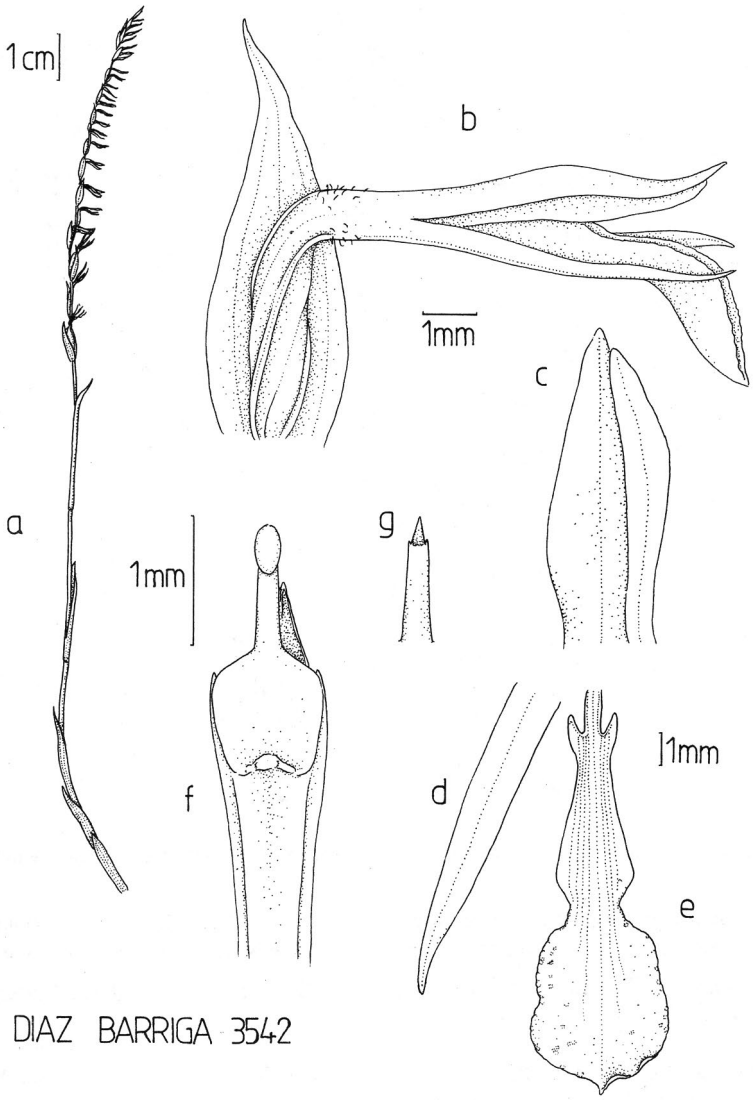

Fig. 16. *Schiedeella llaveana* (Lindl.) Schlecht. var. *alinae* Szlach. a: habit; b: flower; c: galea; d: lateral sepal; e: lip; f: gynostemium; g: rostellum remnant (drawn from holotype – IEB).

Hypochile broad, rhombic, distinctly broader than epichile, side lobes triangular, obtuse. Isthmus acute.

Distribution – Only Mexican state Guerrero.

var. ***alinae*** Szlach. (Fig. 16)

Fragm. Flor. Geobot. **36**(1): 15. 1991. – Type: Mexico, Michoacan, Cerca de Tocuaro, Mpio. Erongaricuaro, 12 Nov 1987, *Diaz Barriga 3542* (Holotype: IEB!).

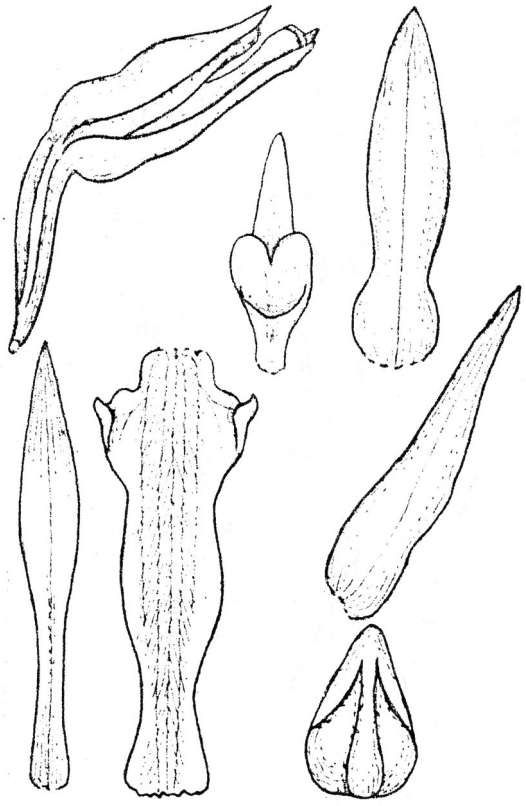

Fig. 17. Flower and floral parts of *Cyclopogon tuerckheimii* (Schlecht.) Schlecht. according to Schlechter (1931).

Epichile distinctly larger than hypochile. Isthmus acute. Perianth segments about 10 times longer than wide. Sepals fused to each other near the base in tube which is about 1/5 of their length.

Distribution – Till now known only from the states of District Federal, Jalisco and Michoacan of Mexico.

Specimens examined – MEXICO. **DISTRICT FEDERAL**. Mexico, Pedregal de San Angel, Cerca de la Ciudad Universitaria, *Diaz de Leon s.n. sub Salazar 2663* (AMO). **JALISCO**. Entre Caule y Los Pericos, Mpio. Talpa, *R. G. Tamayo s.n.* (AMO); idem, *Pizon y R. G. Tamayo 881* (AMO).

Note – Comparison of the type specimens of *Spiranthes transversalis* and *S. tuerckheimii* with *S. llaveana* clearly indicates that the first two should be considered identical to that of *S. llaveana* (Figs 6–7). They do not indicate any essential differences, hence the opinion of Schlechter (1920) that *S. transversalis* should be treated as a separate species and *S. tuerckheimii* included in the genus *Cyclopogon* would seem unjustified. The drawing of *Cyclopogon tuerckheimii* published by Schlechter (1931), however, represents a plant which undoubtedly belongs to this genus (Fig. 17). This probably indicates this author's erroneous interpretation of the flower structure of *S. tuerckheimii*.

In the herbarium material I studied, the specimens of *S. llaveana* with rounded side lobes of the hypochile and more or less rounded constriction between the epi- and hypo-

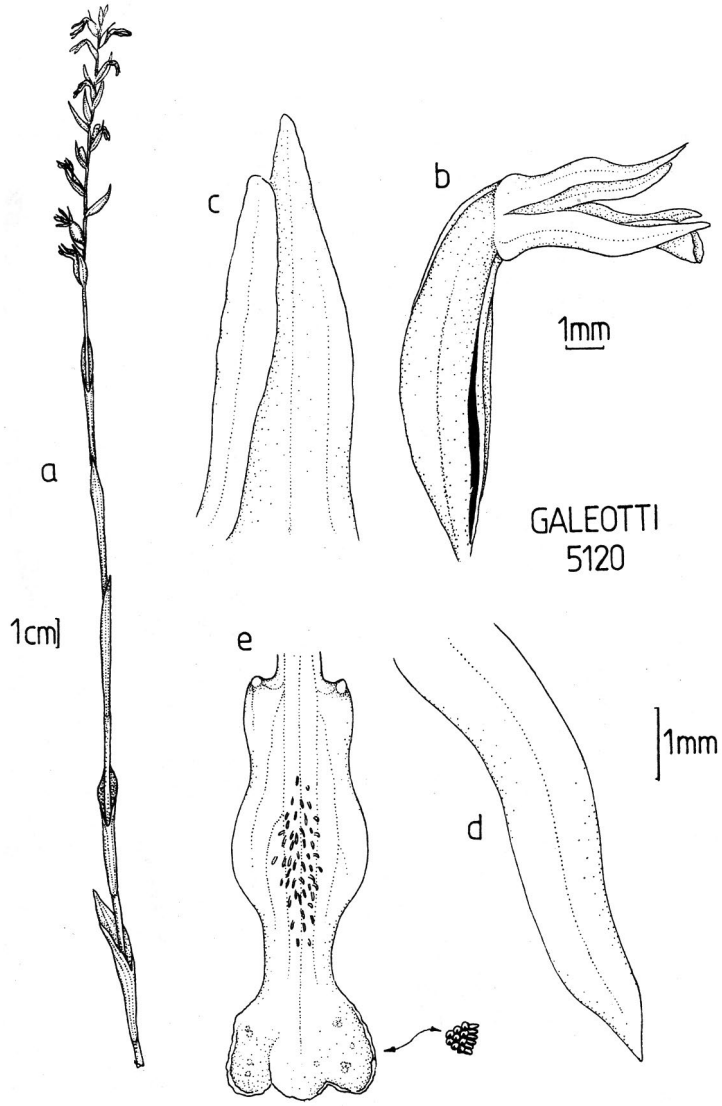

Fig. 18. *Cyclopogon violaceus* (A. Rich. & Gal.) Schlecht. a: habit; b: flower; c: galea; d: lateral sepal; e: lip (drawn from holotype of *Spiranthes violacea* A. Rich. & Gal. – P).

chile, were usually determined as *S. llaveana* var. *violacea*. Garay (1982) considers *S. violacea* to be a good species and places it under the genus *Schiedeella*. There is only one specimen, partially setting fruits, in the sheet with type of *S. violacea* (A. Rich. & Gal.) Garay in the Paris Museum of Natural History (Fig. 18). Despite this, it can be noted that the structure of the gynostemium has all the features characteristic for the genus *Cyclopogon*, namely linear-triangular rostellum with fairly broad base and small, oval, apical viscidium which emerges below the upper epidermis. In effect, the rostellum remnant is

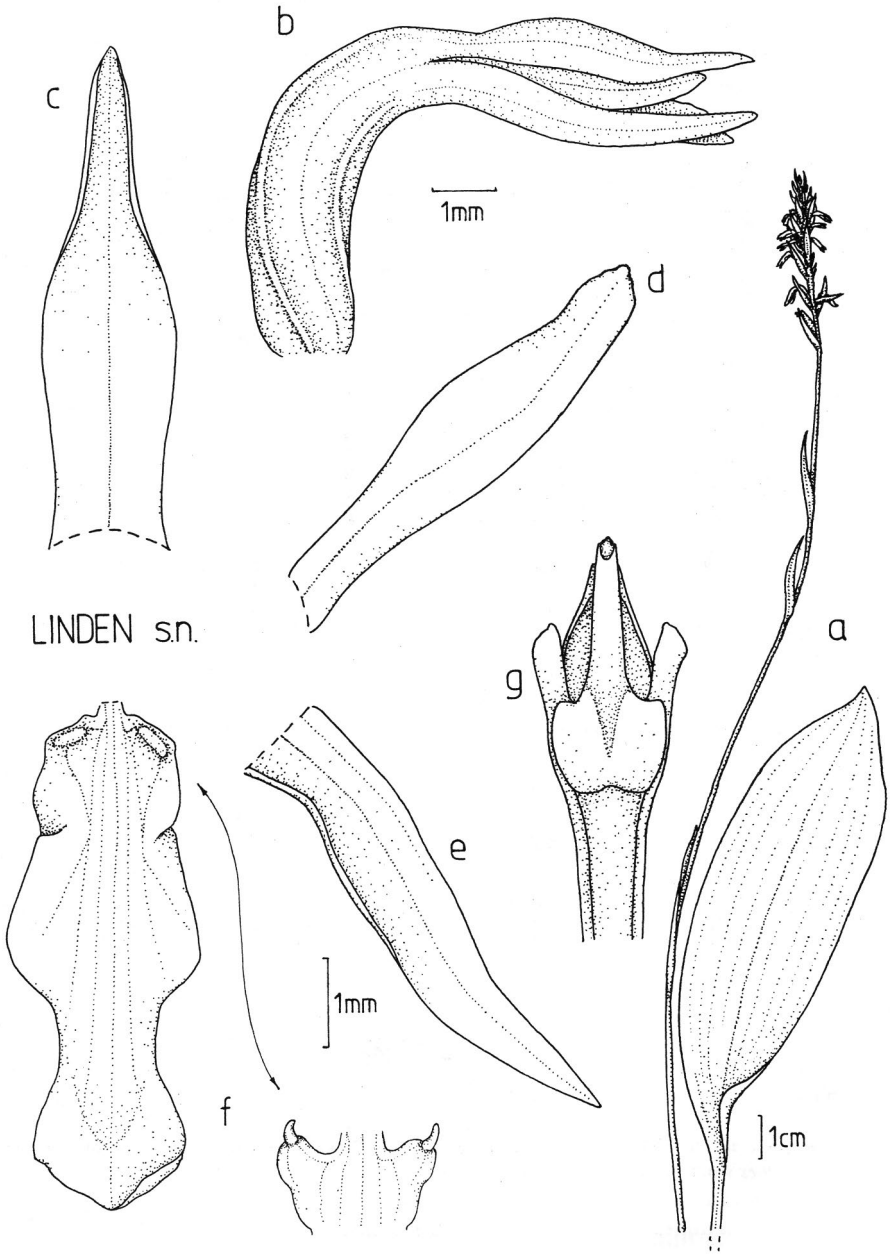

Fig. 19. *Cyclopogon luteo-albus* (A. Rich. & Gal.) Schlecht. a: habit; b: flower; c: dorsal sepal; d: petal; e: lateral sepal; f: lip; g: gynostemium (drawn from holotype of *Spiranthes luteo-alba* Rich. & Gal. – P).

bluntly truncated and slightly concave at the apex. The shape of the lip of *S. violacea* resembles other species of *Cyclopogon*, such as *C. luteo-albus* (A. Rich. & Gal.) Schlecht. or *C. elatus* (Sw.) Schlecht. (thickenings in the shape of horns on the auricles, linear, relatively long isthmus – Fig. 19). Thus Schlechter's (1920) proposal to include *S.*

violacea in the genus *Cyclopogon* is fully justified. The identity of *Cyclopogon violaceus* is a separate problem.

As traditionally understood, *Schiedeella parasitica* boasts a characteristic red thickening in the central part of the lip, basal viscidium and subulate rostellum remnant (cf. Luer 1975; McVaugh 1985). The type specimen of *S. parasitica* suggests *S. llaveana*, differing only in the round lateral lobes of the hypochile, slightly in its shape and broad, rounded isthmus. It thus corresponds with the traditional descriptions of *S. violacea* (cf. Williams 1951; Garay 1982). What is interesting is that in their diagnosis of *S. parasitica* Richard and Galeotti made no mention of the most characteristic feature of the species – the red thickening of the lip. Thus a mistake was made – the name *S. parasitica* was attributed to plants most probably unknown to Richard and Galeotti. It is necessary that nomenclatural changes be made: the name *S. parasitica* should be reserved for species hitherto defined as *S. violacea*, and define the traditionally understood *S. parasitica* as *Schiedeella fauci-sanguinea* (Dod) Burns-Balogh (cf. Burns-Balogh 1989).

Schiedeella valerioi (Ames & Schweinf.) Szlach. & Sheviak (Fig. 20)

Rhodora **92**(869): 16. 1990. – *Spiranthes valerioi* Ames & Schweinf., Sched. Orchid. **10**: 8. 1930. – *S. parasitica* A. Rich. & Gal. var. *valerioi* (Ames & Schweinf.) L. O. Williams, Ceiba **1**: 186. 1950. – Type: Costa Rica, Prov. San Jose, Cerro de las Vueltas, 29 Dec 1925 – 1 Jan 1926, *Standley & Valerio 43952* (Holotype: AMES!).

Roots usually single, rarely 2 or 3, 12–20 mm long, 6–12 mm ∅, tuberoids, ovate to almost rounded, fleshy, densely white pubescent. Stem 150–430 mm high, 1.5–3.0 mm ∅ at the base, 0.9–1.5 mm ∅ under inflorescence, rather delicate, glabrous, only in upper part glandular. Cauline bracts herbaceous, very thin, acute, more or less adnate to the stem. Leaves 2, petiolate; petiole 8–19 mm long, narrow; blade 10–27 mm long, 9–10 mm wide, ovate-lanceolate, broadest in 1/3, acute. During blooming leaves withered. Inflorescence (30–)60–100(–130) mm long, 3–6-flowered, lax. Flower tubular, more opened at the apex. Perianth dull, greenish-white to pale pink. Floral bracts 7–22 mm long, about 1.5 times longer than ovary, usually 3-nerved, ovate-lanceolate, acute, thin, semi-transparent, pale-green. Ovary 4.2–11.0 mm long, cylindrical, narrow, glabrous or almost glabrous. Dorsal sepal 4.3–7.2 mm long, 1.1–2.0 mm wide, 1-nerved, usually broad- or oblong-lanceolate, acute, rarely obtuse, glabrous or only at base sparsely glandular. Lateral sepals 5.0–6.4 mm long, 1.0–1.6 mm wide, 1-nerved, subulate-lanceolate to oblong-triangular, acute, erect or slightly sigmoid, glabrous or sparsely glandular at base. Petals 4.0–6.1 mm long, 0.8–1.5 mm wide, 1-nerved, subulate-oblanceolate, slightly sigmoid, acute or obtuse, widest in the middle or above, at the apex irregular minutely indented. Lip on short claw, indistinctly divided; in natural position boat-shaped, erect with epichile strongly bent down. Hypochile 3.5–4.5 mm long, 1.6–2.1 mm wide, 5-nerved, rectangle, at least 2 times longer than wide, rounded at base, slightly thickened auricles, in the center small thickening of tissue (never red). Isthmus indistinct, rarely rounded. Epichile 1.0–1.7 mm long, 1.0–1.9 mm wide, 3-nerved, tongue-like, ovate to transversely oval, acute or obtuse, minutely irregular indented, papillate. Gynostemium 4–5 mm long, slender, slightly arcute, on ventral surface, beneath stigma with papillate epidermis. Rostellum 1.0–1.1 mm long. Viscidium 0.5 mm long. Rostellum remnant 0.5 mm long. Anther 2 mm long, cordate. Fruit 8–13 mm long, dł., slightly distended below the apex, glabrous, approximetly as long as the bract.

Variability – Shape of the lip (Fig. 20).

Ecology – Terrestrial or epiphyte on lower, withered branches; in cloud forests, mountain oak forests, rarely on dry, grassy plains. Flowers in I to the beginning of III.

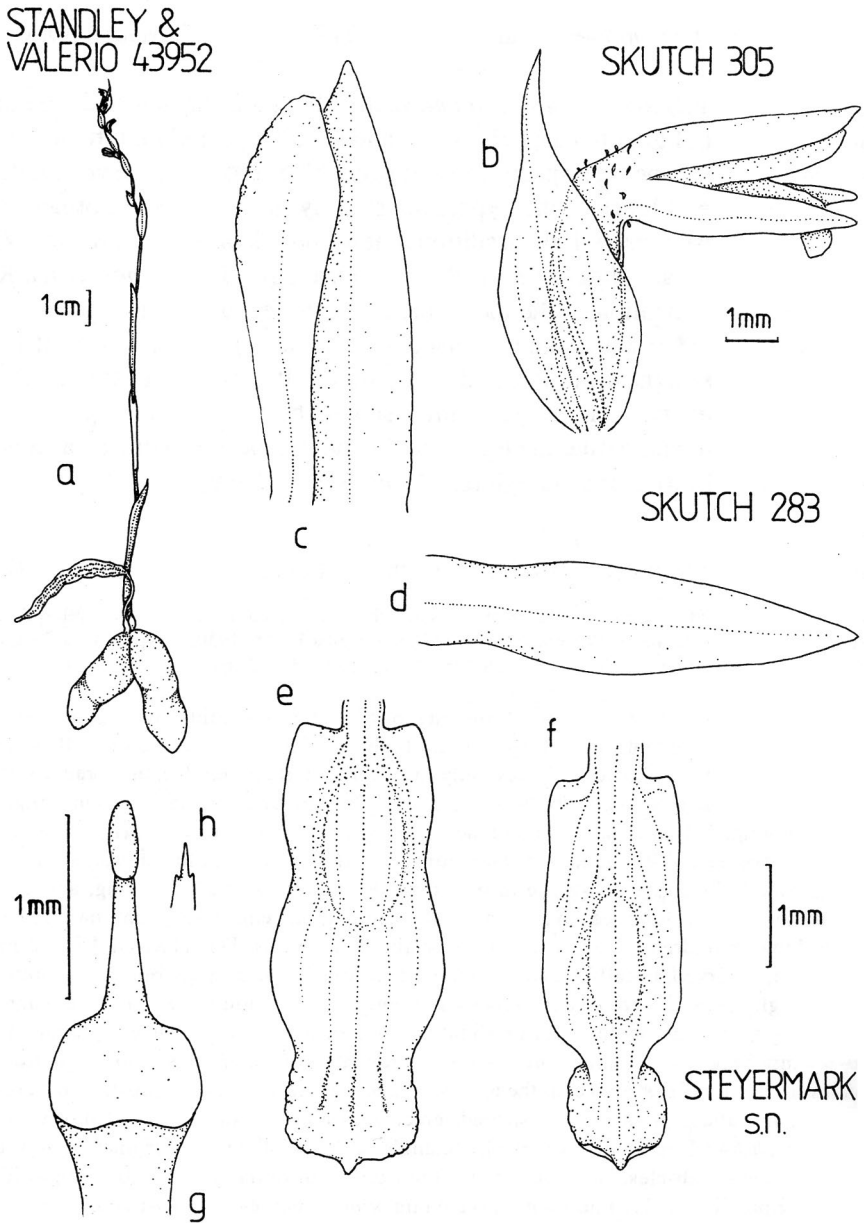

Fig. 20. *Schiedeella valerioi* (Ames & Schweinf.) Szlach. & Shev. a: habit (drawn from holotype – AMES); b: flower; c: galea; d: lateral sepal; e, f: lip; g: gynostemium; h: rostellum remnant.

Distribution – The species was described and known hitherto only from the Province of San Jose in Costa Rica. I found herbarium specimens also collected in Guatemala. Altitude: 2400–3200 m.

Specimens examined – GUATEMALA. **CHIMALTENANGO**. Chichavac, *Skutch 305* (US); Santa Elena, *Skutch 283* (US). **QUEZALTENANGO.** Uppermost ridge of volcan Santa Tomas, *Steyermark s.n.* (F).

COSTA RICA. **SAN JOSE.** Along the trail Canaan to Chorripo via Los Angeles, N of Rio Talari, 9º30'N, 83º32'W, *Burger* & *Liesner 7436* (F).

Note – When describing *Spiranthes valerioi*, Ames and Schweinfurth (1930: 8–9) noticed that the species "...is apparently related to *S. parasitica* and *S. transversalis* (*S. llaveana)*, but it differs from both in the shape of the lip. It also has larger flowers and different petals from *S. nutantiflora*". Subsequent researchers lowered the rank of *S. valerioi* to a variety (Williams 1950), or treated it as a synonym of *"S. parasitica"* (Hamer 1985). My observations indicate that this species is not related to *"S. parasitica"* differing from it by its long, narrow rostellum, apical viscidium, 3-toothed rostellum remnant and shape of the lip (hypochile twice as long as wide, lack of red tissue in center, very small epichile). *Schiedeella valerioi* differs from *S. llaveana* in its reduced auricles and ratio of perianth length to lip. The lip of *S. llaveana* is distinctly longer than other petals, whereas in *S. valerioi* of the same length at most.

Schiedeella wercklei (Schlecht.) Garay (Figs 21 & 22)

Bot. Mus. Leafl. Harv. Univ. **28**(4): 358. 1982. – *Spiranthes wercklei* Schlecht., Repert. Spec. Nov. Reg. Veg. **10**: 482. 1911. – Type: Costa Rica, "ohne nähere Standtortsangabe", *Werckle s.n.* (Holotype: B†; iconotype: AMES!).

Schideella dodii Burns-Balogh, Die Orchidee **40**(5): 169. 1989, *syn. nov.* – Type: Dominican Republic, San Jose de Ocoa, Raid farm, 7 km on road to La Lagunita, 1 Jan 1981, *Dod 747* (Holotype: US!).

Roots 2–3, 17–30 mm long, 5–7 mm in ∅, tuberoids, oblong-ovate, fleshy, densely white pubescent. Stem 140–250 mm tall, 2 mm in ∅ at base, 0.5 mm in ∅ under inflorescence, delicate, in lower part glabrous, towards the apex glandular, green. Cauline bracts 6, shorter than internodes, semi-transparent, thin, acute, 3-nerved, glabrous. Leaf single, sometimes absent during flowering, petiolate. Petiole 20–30 mm long, narrow. Blade 40–70 mm long, 25–40 mm wide, ovate to lanceolate-cordate, acute, with subcordate-rotundate base. Inflorescence 25–50 mm long, 5–12-flowered, lax. Flowers tiny, horizontal, green to yellowish-green with white lip. Floral bract 5–8 mm long, more or less as long as the ovary, herbaceous, semi-transparent, acute, glandular on outer surface, green. Ovary 4–6 mm long, glandular, green. Dorsal sepal 4.0–5.5 mm long, 1.0–1.5 mm wide, oblong-lanceolate, acute to obtuse, glandular on outer surface, 3-nerved. Lateral sepals 4–6 mm long, 1.0–1.5 mm wide, triangular-lanceolate, acute, slightly assymetric, glandular on outer surface, 3-nerved. Petals 4–5 mm long, 0.5–0.7 mm wide, oblanceolate to spathulate, obtuse, very thin, 1-nerved. Lip almost sessile, indistinctly constricted. In natural position erect. Hypochile 3.5–4.0 mm long, 1.5–2.5 mm wide, lyre-like, with small, rounded auricles at base, side lobes wing-shaped. Isthmus indistinct, sometimes lacking. Epichile 1.2–1.4 mm long, 1.2–1.3 mm wide, more or less quadrate, subtruncate to truncate at apex. Gynostemium 3–4 mm long, erect, slender. Rostellum remnant 0.9 mm long.

Variability – No data.

Ecology – Terrestrial, noted in wet forest and cut-over old mixed pine forest; on loose soil. Flowering season in I–II.

Distribution – Costa Rica, Nicaragua (Hamer 1984) and Dominican Republic. Altitude 1000–1500 m.

Specimens examined – NICARAGUA. **JINOTEGA.** Jinotega Grade, *Heller 9032* (SEL).

Note – This species seems to be closely related to *Schiedeella valerioi*.

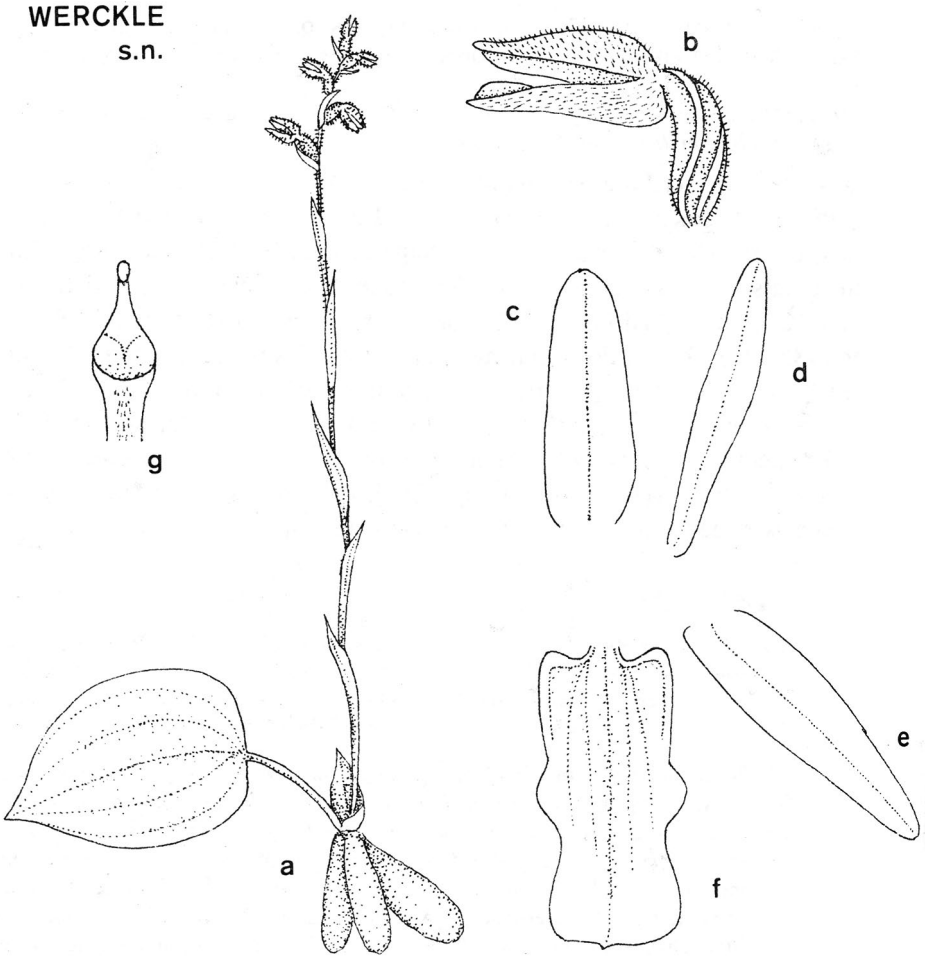

Fig. 21. *Schiedeella wercklei* (Schlecht.) Garay. a: habit; b: flower; c: dorsal sepal; d: petal; e: lateral sepal; f: lip; g: gynostemium (redrawn from iconotype of *Spiranthes wercklei* Schlecht. – AMES).

Schiedeella amesiana Garay (Fig. 23)

Bot. Mus. Leafl. Harv. Univ. **28**(4): 357. 1982. – *Spiranthes wrightii* Ames, Orchidaceae **7**: 131. 1922, *non* Schlechter 1913. – Type: Cuba, Monte Verde, 19 Feb 1859, *Wright 1480* (Holotype: AMES!).

Stem 150–440 mm tall, at base 3 mm ∅, under inflorescence 1.5 mm ∅, delicate, erect, in lower part glabrous, above the highest bract glandular. Whole plant red in colour. Cauline bracts 7, herbaceous, lower longer than, upper shorter than internodes. Leaf single. Petiole about 110 mm long, narrow. Blade 100 mm long, 60 mm wide, oval, acute or obtuse, dark green on upper surface, red on lower one. Inflorescence up to 100 mm long, 2–16-flowered, lax. Flowers erect, tubular, reddish, with red-green nerves on the lip. Floral bract 7 mm long, more or less as long as the ovary, ovate-lanceolate, acute, 3–5-nerved. Ovary 6 mm long, erect, glandular. Dorsal sepal 5 mm long, 1.2 mm wide, ovate-lanceolate, obtuse, on the outer surface at base glandular, 1–5-nerved. Lateral sepals 6 mm long, 1.2 mm wide, symmetric, oblong-lanceolate, acute, at the base glandular, 1–5-nerved. Petals 4.5 mm long, 0.5 mm wide, subulate-spathulate, widest in the upper part, obtuse, 1-nerved. Lip on claw, fused with lat-

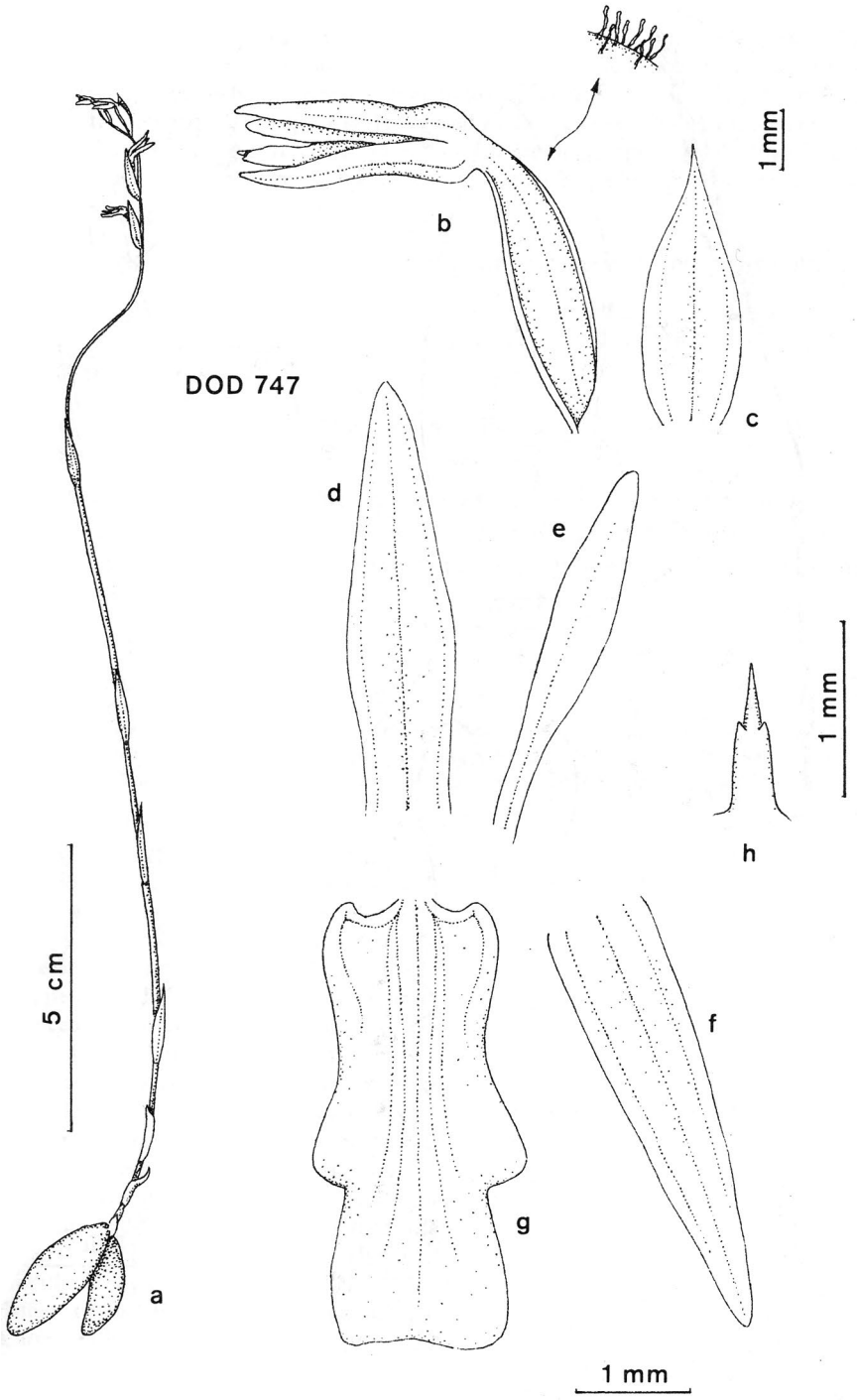

Fig. 22. *Schiedeella wercklei* (Schlecht.) Garay. a: habit; b: flower; c: bract; d: dorsal sepal; e: petal; f: lateral sepal; g: lip; h: rostellum remnant (drawn from holotype of *Schiedeella dodii* Burns-Balogh. – US).

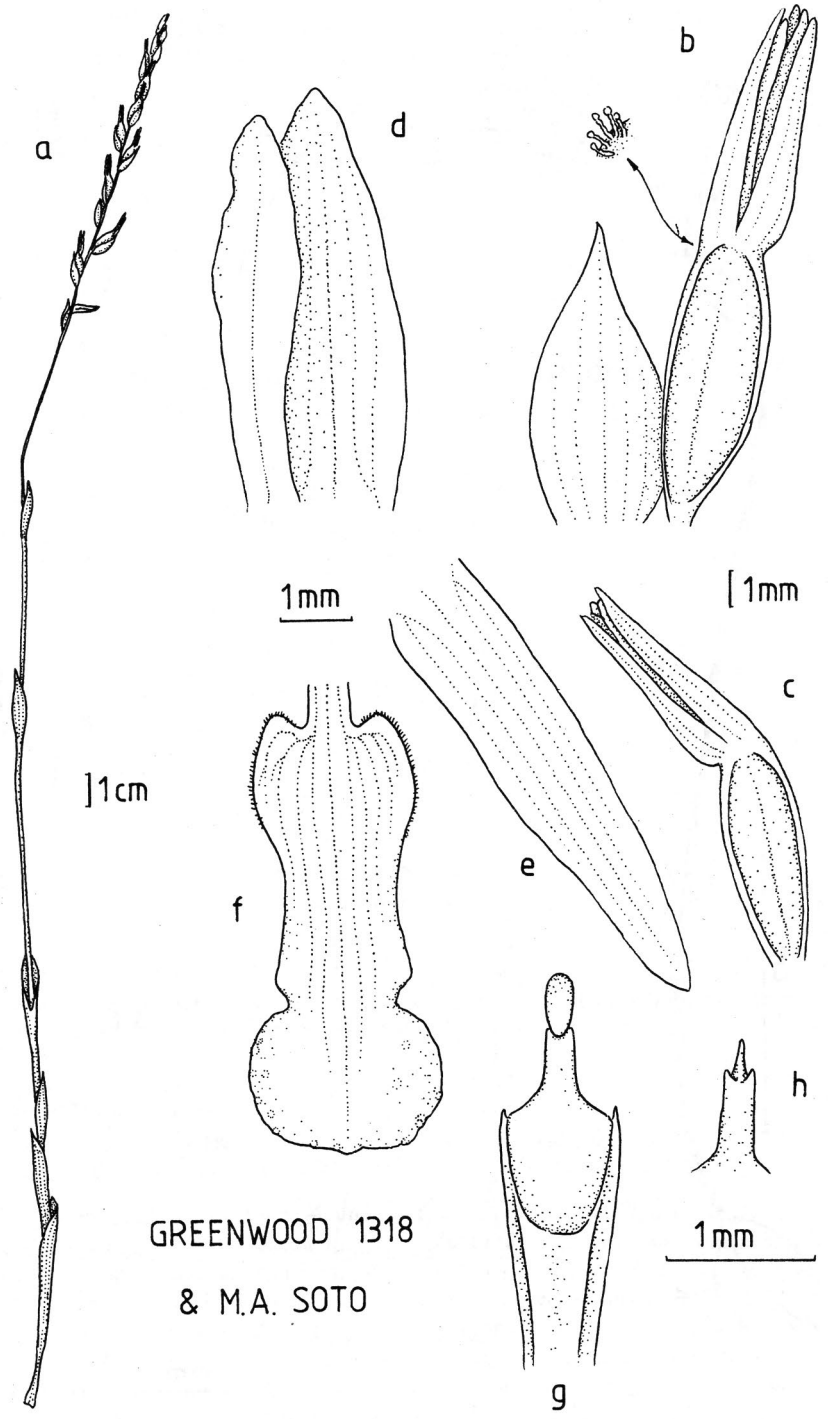

Fig. 23. *Schiedeella amesiana* Garay. a: habit; b, c – flower; d: galea; e: lateral sepal; f: lip; g: gynostemium; h: rostellum remnant.

eral sepals, with distinct sharp constriction. Hypochile 4 mm long, 2 mm wide, oblong-lyre-like, broadest at the base, in the center slightly thickened, auricles rounded, thin, pubescent on margins. Epichile 2 mm long, 2.3 mm wide, transversely oval, obtuse, papillate. Gynostemium 4 mm long, erect, only at base slightly arcuate, on the upper surface fused to dorsal sepal. Column foot short, adnate to the ovary. Rostellum 0.8 mm long, subulate. Viscidium 0.4 mm long, apical, oval. Rostellum remnant 0.7 mm long, 3-dentate at the apex, lateral teeth reduced. Anther 2 mm long, cordate-ovate.

Variability – No data.

Ecology – Terrestrial, in dense forests, apomictic. Flowering specimens collected in II and XI.

Distribution – So far known only from Cuba and the State of Michoacan, Mexico. Altitude 2020 m above the sea.

Specimens examined – MEXICO. **MICHOACAN**. Morelia, km 19 S of Sta. Maria, *Greenwood 1318 & Miguel A. Soto s.n.* (AMO).

Note – With its erect flowers, *Schiedeella amesiana* suggests *S. nagelii* and *S. trilineata*, but it would seem more closely related to *S. valerioi* and *S. wercklei*. The latter species resembles it with the shape of the lip, particularly the hypochile and the position of the anther relative to the stigma.

Schiedeella nagelii (L. O. Williams.) Garay (Fig. 24)

Bot. Mus. Leafl. Harv. Univ. **28**(4): 357. 1982. – *Spiranthes nagelii* L. O. Williams, Bot. Mus. Leafl. Harv. Univ. **12**: 230. 1946. – "*Schiedeella nagelii* L. O. Williams" *ex* Balogh, Orquidea (Mex.) **8**(1): 39. 1981. – Type: Mexico, San Luis Potosi, mountain in district of Juarez near Cerritos, long. 100°49'W, lat. 22°10'N, 3 Sep 1936, *Dino & Nagel 6187* (Holotype: AMES!; isotype: US!, F! – photo).

Roots usually 4–10, 25–100 mm long, 2–8 mm ∅, clustered, cylindrical, fleshy, densely white pubescent. Stem 120–310 mm tall, 1.3–3.5 mm ∅ at base, 0.8–2.0 mm ∅ under inflorescence, during blooming delicate, with pedunculate inflorescence, during setting fruits erect and stout, glabrous, only in upper half glandular. Cauline bracts in lower part longer, in upper as long as or shorter than internodes, adnate to the stem or bent back, acute, herbaceous. Leaves present during flowering, usually (1–)2–3(–4), petiolate. Petiole 10–40 mm long, narrow. Blade 15–90 mm long, 10–55 mm wide, ovate to broad lanceolate, widest more or less in the middle or beneath, acute, thin. Inflorescence (10–)30–80(–100) mm long, usually 2–6-flowered, lax. Flowers almost erect, medium-sized, with the shallow cavity at the base, pale pink. Floral bract 10–17 mm long, lanceolate, acute, semi-transparent, slightly glandular outside. Ovary 7–10 mm long, erect, cylindrical, densely glandular. Dorsal sepal 12–15 mm long, 3–5 mm wide, lanceolate, widest more or less in the middle, acute, 3-nerved, sparsely glandular outside. Lateral sepals 10–13 mm long, 2–3 mm wide, 3–5-nerved, linear-lanceolate or lanceolate, acute, widest at base, slightly sigmoid, sparsely glandular outside at base. Petals 11–14 mm long, 1.0–1.5 mm wide, 1-nerved, linear, obtuse, slightly sigmoid. Lip divided into the hypo- and epichile. In natural position slightly sigmoid. Hypochile with claw 8–10 mm long, 4–6 mm wide, with distinct, slightly fleshy and pubescent auricles at base, in the center slightly thickened and pubescent, obovate. Isthmus acute. Epichile 4.2–5.0 mm long, 4 mm wide, tongue-like or cordate, sharply pointed or obtuse, irregularly minutely indented,papillate. Gynostemium 10–12 mm long, erect, only at base arcuate, slender, beneath stigma distinctly pubescent. Rostellum 2–3 mm long, subulate. Viscidium up to 2 mm long. Rostellum remnant 1.5 mm long, distinctly 3-dentate or triangular at apex. Anther up to 4.5 mm long, oblong-cordate.

Variability – No data.

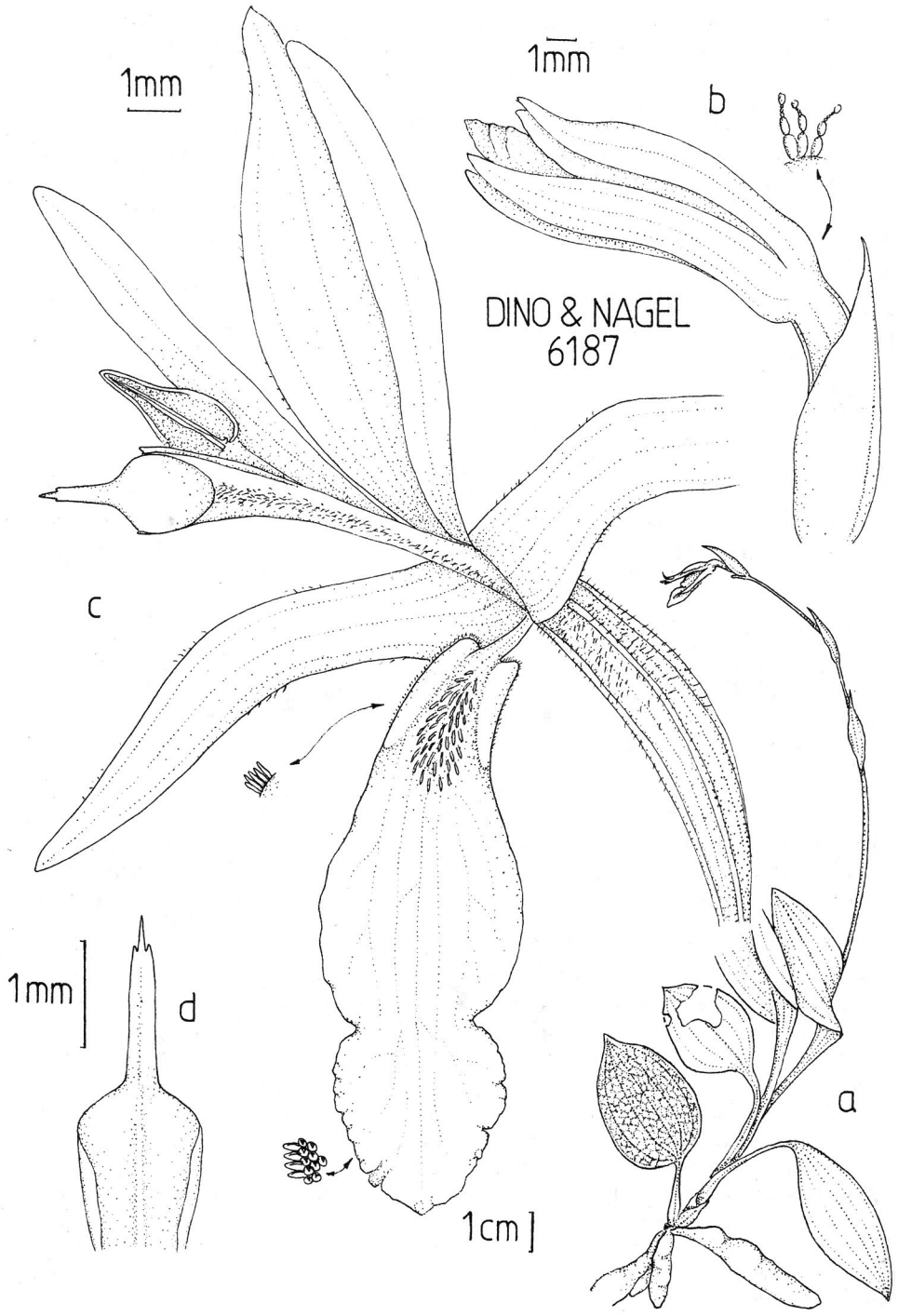

Fig. 24. *Schiedeella nagelii* (L. O. Williams) Garay. a: habit; b: flower; c: flower with all parts spread; d: rostellum remnant (drawn from type specimen of *Spiranthes nagelii* L. O. Williams – AMES).

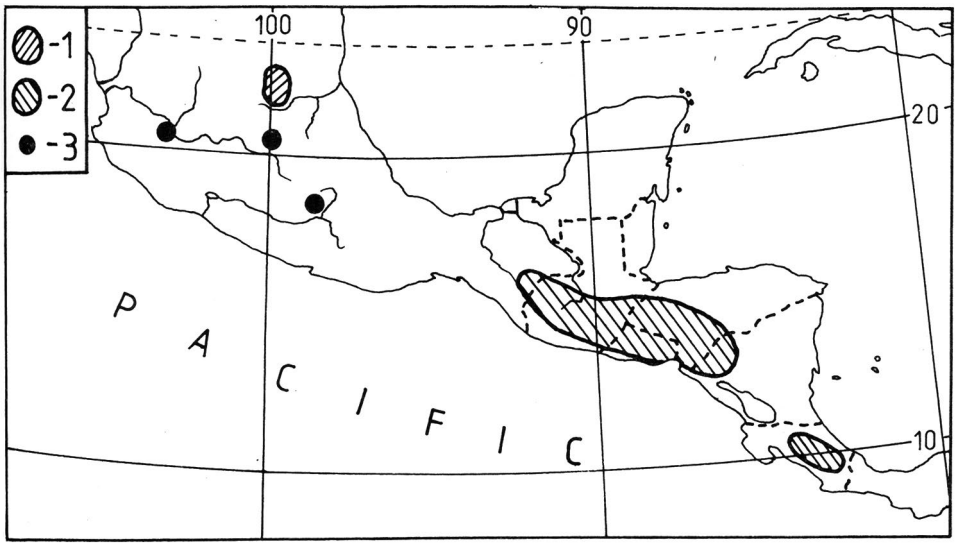

Fig. 25. Distribution of *Schiedeella nagelii* (L. O. Williams) Garay (1), *S. trilineata* (Lindl.) Balogh var. *trilineata* and var. *thelymitra* (Reichenb. f.) Szlach. (2) and var. *crenulata* (L. O. Williams) Szlach. (3).

Ecology – Usually on loose, black soil, or leaf humus; amongst rocks. Flowers in VIII to X.

Distribution – The species described and known so far only from the State of San Luis Potosi of Mexico (Fig. 25). Altitude 700–1900 m.

Specimens examined – MEXICO. **SAN LUIS POTOSI**. Region of mountains above Tamasopo, *Dino 6931* (SEL); region of Villa Juarez, *Dino 6497* (US).

Note – Williams (1951) and Burns-Balogh (1986, pers. inf.) consider *Spiranthes nagelii* to be closely allied to *S. durangensis*. According to Williams (1951: 230) *S. nagelii* differs from this by "... broad leaves which are present at flowering times, ... a lip which is only slightly constricted towards the middle and has basal calli which form small auricles". Apart from the features mentioned, the two species differ in the structure of the gynostemium. It is my opinion that as regards the morphology of the perianth and generative parts, *S. nagelii* has more features in common with *S. trilineata* and that its similarity to *S. durangensis* is only superficial.

Schiedeella trilineata (Lindl.) Balogh (Fig. 26)

Orquidea (Mex.) **8**(1): 40. 1981. – *Spiranthes trilineata* Lindl. *in* Benth., Pl. Hartw. 94. 1842; – *Deiregyne trilineata* (Lindl.) Schlecht., Beih. Bot. Centralbl. **37**(2): 428. 1920. – *Gularia trilineata* (Lindl.) Garay, Bot. Mus. Leafl. Harv. Univ. **28**(4): 322. 1982. – Type: Guatemala, valley of Guatemala, Jan 1840 (?), *Hartweg s.n.* (Holotype: K-L! – photo).

Roots 2–6, 10–70 mm long, 1–12 mm ∅, clustered, usually cylindrical, narrow, sometimes tuberoids, white pubescent. Stem 60–205 mm high, 1.0–4.1 mm at ∅, 0.7–2.0 mm ∅ under inflorescence, erect, glabrous; whitish or brownish. Cauline bracts 4–8, more or less adnate to the stem, sharply pointed, herbaceous with hyaline margins, green, pink or brownish. Leaves lacking during blooming, at

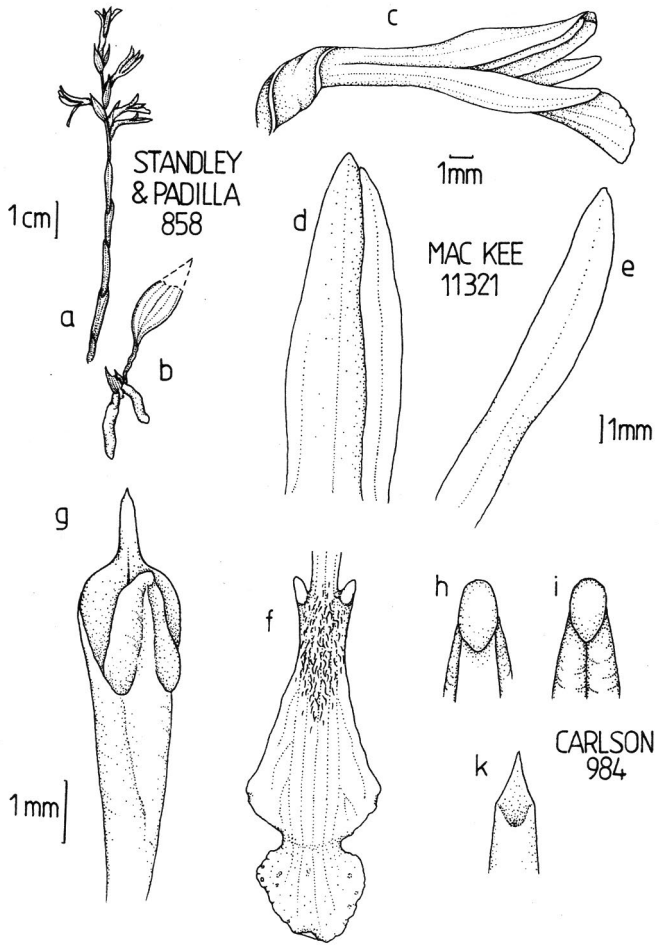

Fig. 26. *Schiedeella trilineata* (Lindl.) Balogh. a: habit; b: leaf with roots; c: flower; d: galea; e: lateral sepal; f: lip; g: gynostemium; h: rostellum with viscidium, bottom view; i: top of pollinarium with viscidium; k: rostellum remnant.

base of stem withered petioles only (15–20 mm long). Inflorescence 10–70 mm long, (1–)2–16-flowered, dense, sometimes capitate, to lax. Flowers suberect, apical ones erect, tubular, opened at apex only, glabrous; usually white with green nerves on petals, rarely dull white or white with pink deposit, or yellow. Floral bracts 5–21 mm long, as long as or 1.5 times longer than ovary, ovate to broad lanceolate, acute, semi-transparent, thin, herbaceous with hyaline margins. Ovary 4–7 mm long, glabrous. Dorsal sepal 9.5–14.0 mm long, 1.6–3.2 mm wide, usually lanceolate to oblong-lanceolate, broadest in the middle or beneath, acute, near the apex slightly concave, 1- or rarely 3-nerved. Lateral sepals 10.0–14.5 mm long, 1.0–2.9 mm wide, 1-nerved, linear to linear-oblanceolate, acute or obtuse, broadest in the upper part, slightly sigmoid or falcate. Petals 9.5–14.0 mm long, 0.8–1.2 mm wide, 1-nerved, usually linear to linear-lanceolate, sigmoid or falcate, acute or obtuse. Lip usually distinctly constricted below the middle, on long claw adnate to lateral sepals. In natural position through-like, straight. Hypochile 5.5–12.5 mm long, 1.8–5.5 mm wide, longer than epichile, greatly varied in shape, oblong-triangular, obovate-lanceolate, ovate; broadest under apex, at base two, fleshy, pubescent auricles, in the center slightly thickened and pubescent, side lobes rounded, rarely triangular, sharply pointed. Isthmus if present 1.3–2.3 mm wide, acute or rounded. Epichile 2–5 mm long, 2.0–4.6 mm

wide, reniform or cordate, obtuse or sometimes acute, broadest at base, papillate, usually irregularly indented, sometimes folded. If the lip undivided – usually oblanceolate, obtuse, below the center with small lobes. Gynostemium 7.0–13.5 mm long, erect, slender, pubescent beneath stigma. Rostellum subulate. Viscidium 0.8–1.0 mm long, oval. Rostellum remnant 1–2 mm long, triangular and slightly concave at apex. Anther 2.3–4.5 mm long, not reaching the base of rostellum. Fruit 8–10 mm long, with long tube of dried perianth on apex.

Ecology – On sandy, sandy-loamy soils; usually in full sun, on dry fields and on pasture, savannah, but also in mixed pine-oak forests. Flowers between I and III.

Variability – Shape of the lip (cf. Szlachetko 1991b). I propose to distinguish four varieties:

var. ***trilineata***

Lip without distinct constriction, only at the apex slightly narrowed.

Distribution – Mexico (Chiapas), Guatemala, Honduras (Fig. 25).

Specimens examined – MEXICO. **CHIAPAS**. Near Comitan, long. 91º54'W, lat. 16º9'N, *Nagel 4558* (US); near Tapancuapan, E of Comitan, *Nagel 5670* (US);
HONDURAS. **COMAYAGUA**. Vicinity of Siguatepeque, *Standley 56508* (US);

var. ***undulata*** Szlach.

Fragm. Flor. Geobot. **36**(1): 16. 1991. – Type: Guatemala, Dept. Guatemala, "La Aurora", "Vara de San Jose", Fecha Enero de 1927, Morelos, *Deter & Standley 620* (Holotype: US!).

Lip without constriction, oblanceolate, obtuse, widest in 2/3 of length, below the center distinctly folded.

Distribution – Guatemala.

Specimens examined – GUATEMALA. Sine loco et dato, *Skinner s.n.* (W-R, K-L – photo).

var. ***thelymitra*** (Reichenb. f.) Szlach.

Fragm. Flor. Geobot. **36**(1): 16. 1991. – *Spiranthes thelymitra* Reichenb.f., Beitr. Orch. Zentr.-Am. 66. 1866. – *Deiregyne thelymitra* (Reichenb. f.) Schlecht. Beih. Bot. Centralbl. **37**(2): 1920. – *Sarcoglottis thelymitra* (Reichenb. f.) Ames, Bot. Mus. Leafl. Harv. Univ. **2**: 76, 84. 1934. – *Spiranthes trilineata* (Lindl.) Balogh var. *thelymitra* (Reichenb. f.) L. O. Williams *ex* Correll, Lloydia **10**: 209. 1947. – Type: Guatemala, near Oratoria, Yalpataque, 2 Jul 1857, *Wendland 379* (Iconotype: W-R – photo).

Spiranthes hondurensis Schlecht., Beih. Bot. Centralbl. **36**(2): 378. 1918. – *Deiregyne hondurensis* (Schlecht.) Schlecht., Beih. Bot. Centralbl. **37**(2): 427. 1920. – Type: Honduras, road from Tegucigalpa to Comayagua, Feb 1898, *Niederlein s.n.* (Holotype: B†; iconotype: AMES!).

Lip with distinct constriction in the lower part, divided into hypo- and epichile. Epichile more or less folded, distinctly smaller than hypochile.

Distribution – Mexico (Chiapas), Guatemala, El Salvador, Honduras, Nicaragua (Fig. 25).

Specimens examined – MEXICO. **CHIAPAS**. E of Comitan, long. 91º54'W, lat. 16º09'N, *Nagel 4448 & 4558* (US, F – 2); E of Comitan, near Tepancuapan, *Nagel 5670* (US); no exact localization: Pce de Bochit, *Linden 1220* (G); Prov. de San Luis (Potosi ?), *Voiler 490* (P).
GUATEMALA. **CHIMALTENANGO**. Lugar Alameda, *Johnston 575* (F). **GUATEMALA**. Pamplona, *Levis 64518* (F); on hills along road between Guatemala and San Raimundo, *Standley 63010* (F). **HUEHUETENANGO**. Near city, *van Hook 5* (F); Hacienda el Narauko, *Wendland 85* (W-R). **ZACAPA**. Sierra de Las Minas, near river at Santa Rosalia de Marmol, between Santa Rosalia and Vegona, *Steyermark 43135* (F).

NICARAGUA. S of Esteli, *McGillivary s.n.* (SEL).

EL SALVADOR. **AHUACHAPAN**. Vicinity of Ahuachapan, *Standley* & *Padilla 2833* (F) & *858* (SEL). **SANTA ANA**. Cerro Miramundo, above Hacienda Los Planos, NE of Metapan, *Carlson 984* (F).

HONDURAS. **COMAYAGUA**. Vicinity of Siguatepec, *Standley 56508* (US, F) & *56459* (F); "Vara de San Jose", vicinity of Siguatepeque, *Standley* & *Chacon 6206* & *6104* (F). **MORAZAN**. Las Mesas, near Zamorano, *MacKee 11321* (P, US); Zamorano, *Carlson 3197* (F, US – 2); Chaquite, *J. Valerio R. 2066* (F). **EL PARAISO**. Vicinity of Guinope, *Standley* & *Williams 4592* (F).

var. ***crenulata*** (L. O. Williams) Szlach.

Fragm. Flor. Geobot. **36**(1): 16. 1991. – *Spiranthes trilineata* var. *crenulata* L. O. Williams, Bot. Mus. Leafl. Harv. Univ. **12**: 236. 1946. – *Gularia crenulata* (L. O. Williams) Garay, Bot. Mus. Leafl. Harv. Univ. **28**(4): 322. 1982. – Type: Mexico, Puebla, La Mesa, Necaxa, long. 98°00'W, lat. 20°11'N, 21 Feb 1932, *Froderstrom 2592* (Holotype: AMES!).

Lip divided into the hypo- and epichile. Epichile distinctly broader than hypochile.

Distribution – Mexico (Jalisco, Puebla, Queretaro). Recorded also from Costa Rica (Hamer 1981) (Fig. 25). Altitude 1000–2500 m.

Specimens examined – MEXICO. **JALISCO**. Guadalajara, *Manuel Rodriguez s.n.* (AMO). **QUERETARO**. La Canada, 2 km al N de Tilaco, *E. Gonzales P. 387* (IEB).

Note – *Schiedeella trilineata* var. *trilineata* is extremely rare in collections, it may be that it is only a semipeloric form of the *thelymitra* variety. This would be indicated by the mixed population of both taxa (cf. *Nagel 4558, 5670; Standley 56508*). This problem requires detailed population studies in the field. *S. trilineata* is the closest relation of *S. nagelii.*

Subgenus *SCHIEDEELLOPSIS* Szlach., Fragm. Flor. Geobot. **36**(1): 16. 1991. Type: *Schiedeella dendroneura* (Sheviak & Bye) Balogh (*Spiranthes dendroneura* Sheviak & Bye).

Rostellum short, viscid basal, oval or ovate, small. Rostellum remnant shortly 3-dentate (middle tooth slightly longer than laterals) or subulate. Anther nearly as long as gynostemium.

The subgenus comprises four species: *Schiedeella dendroneura* (Sheviak & Bye) Balogh, *S. schlechteriana* Szlach. & Sheviak, *S. fragrans* Szlach. and *S. fauci-sanguinea* (Dod) Burns-Balogh included into two sections.

KEY TO THE SPECIES (Fig. 5):

1. Lip strongly thickened in the center, red in colour, rostellum remnant subulate (sect. *Gemmorchis*) ..... *S. fauci-sanguinea*
1. Lip thin, rostellum remnant 3-dentate (sect. *Schiedeellopsis*) 2
   2. Auricles reduced, broadly rounded, isthmus indistinct ..... *S. dendroneura*
   2. Auricles finger-like, fleshy, isthmus distinct 3
3. Auricles directed towards the lip base, epichile distinctly broader than hypochile .... *S. fragrans*
3. Auricles directed towards the lip apex, epichile more or lessas broad as hypochile .... *S. schlechteriana*

Section SCHIEDEELLOPSIS

Lip thin. Rostellum remnant shortly 3-dentate.

Schiedeella dendroneura (Sheviak & Bye) Balogh (Fig. 27)

Orquidea (Mex.) **10**(1): 92–93. 1986. – *Spiranthes dendroneura* Sheviak & Bye, Brittonia **32**(3): 368. 1980. – *Deiregyne dendroneura* (Sheviak & Bye) Garay, Bot. Mus. Leafl. Harv. Univ. **28**(4): 312. 1982. – Type: Mexico, Chihuahua, Mpio. de Urique Sawarare, near Napuchi and NE of Samachique (27°19'N, 107°31'W), S of Barranca del Cobre, 2 Jan 1973, *Bye 3944* (Holotype: NYS!; isotype: NY!).

Roots single, 20–27 mm long, 4–7 mm ∅, cylindrical, glabrous. Stem 100–200 mm high, 0.8–2.0 mm ∅ at base, 0.2–0.5 mm ∅ under inflorescence, delicate, erect, glabrous, reddish-rusty. Cauline bracts 5–8, 3-nerved, adnate to the stem, membranaceous, drying during blooming. Leaves lacking

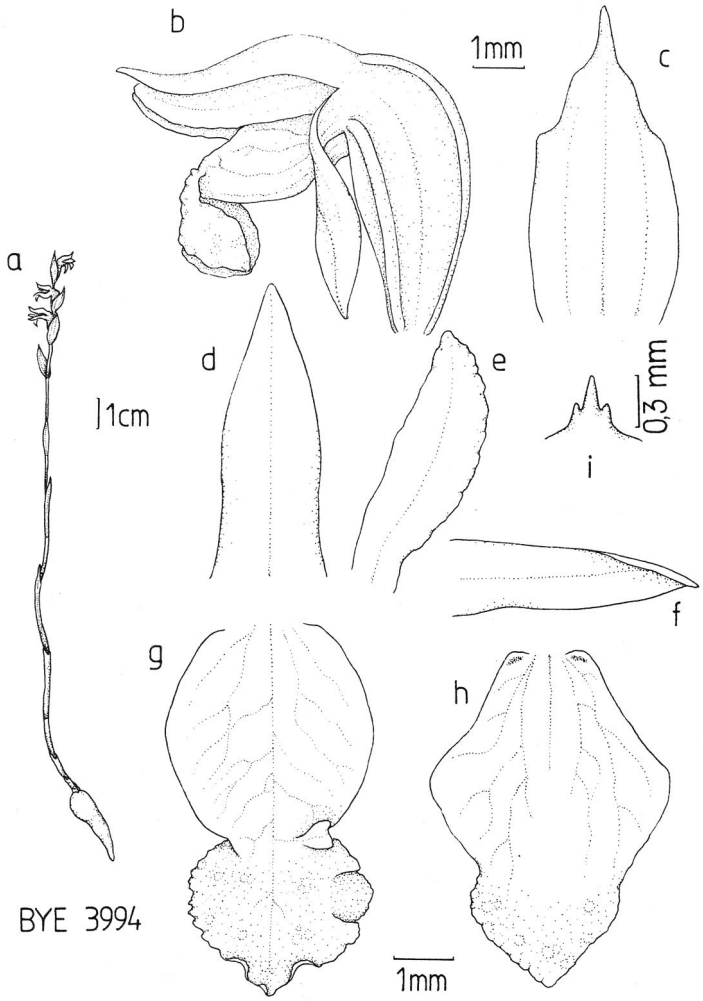

Fig. 27. *Schiedeella dendroneura* (Sheviak & Bye) Balogh. a: habit; b: flower; c: bract; d: dorsal sepal; e: petal; f: lateral sepal; g, h: lip; i: rostellum remnant (drawn from holotype of *Spiranthes dendroneura* Shev. & Bye – NYS).

during blooming. In culture from one to few, sessile, oblong, about 10 mm long (Sheviak & Bye 1980). Inflorescence 25–50 mm long, spiral, lax, few-flowered. Flowers small, campanulate-opened, lateral sepals spread. Ovary and perianth glabrous. Perianth reddish-rusty, darker strations, lip white, in center green-yellow, with darker nerves, nerves turned red. Floral bracts 5–7 mm long, 3-nerved, narrow ovate-lanceolate, acute, membranaceous, transparent, nearly as long as ovary. Ovary 2–6 mm long, obovate. Dorsal sepal 5 mm long, 1.5–1.8 mm wide, oblong-lanceolate, obtuse, broadest at base, 1-nerved. Lateral sepals 4 mm long, 1.1 mm wide, 1-nerved, linear-lanceolate, acute, broadest at base, edges slightly furled. Petals 4.0–4.6 mm long, 1.0–1.1 mm wide, 1-nerved, lanceolate-spathulate, obtuse, broadest in the middle or beneath, irregularly indented at apex. Lip nearly sessile, undivided (4–5 mm long, 2.5 mm wide) or indistinctly divided, in natural position lip slightly concave in the center, with down-turnedepichile. Hypochile 2.9 mm long, 3 mm wide, ovate to rhombic, broadest in the middle or beneath, in center slightly thickened, side lobes rounded or triangular, obtuse, base rounded, slightly thickened auricles, dendric nervation. Isthmus acute, if present. Epichile 1.6 mm long, 2.1 mm wide, cordate, papillate, acute, folded, irregular indented. Gynostemium 2 mm long, erect, short, relatively massive. Rostellum short, lanceolate. Viscidium small. Rostellum remnant 0.3 mm long. Anther 2 mm long, cordate.

Variability – Shape of the lip (Fig. 27).

Ecology – Sunny places and openings in pine-oak forests. According to Sheviak & Bye (1980) the species occurs in areas characterised by dry and cold winters. Inflorescence appears in late spring or early summer. Short-lived leaf and new root appear immediately after dischargeof seeds in summer. *S. dendroneura* is not an apomoctic species. Blooms in VI.

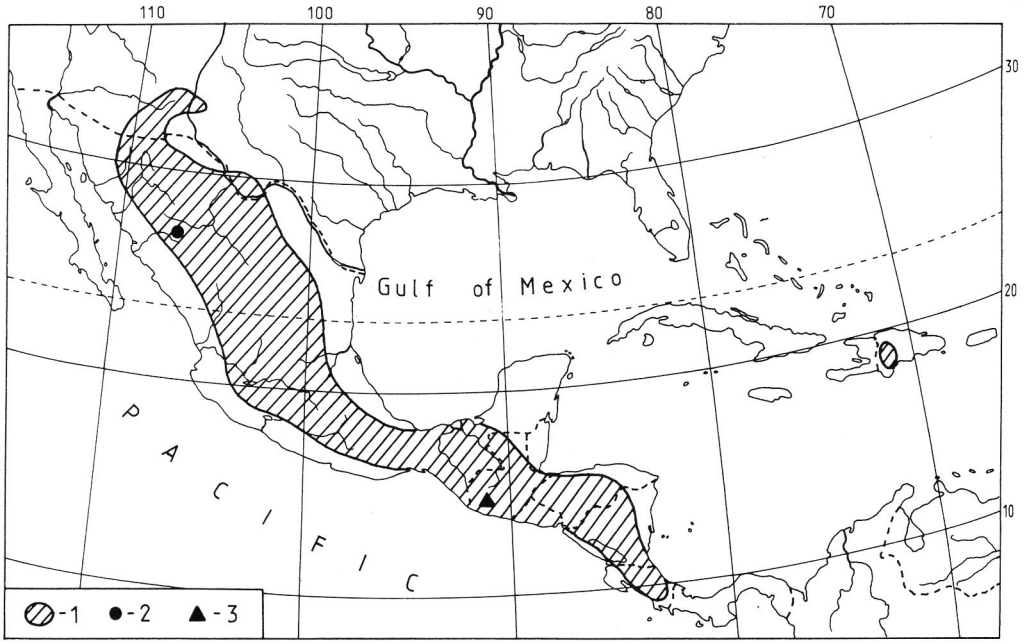

Fig. 28. Distribution map for *Schiedeella fauci-sanguinea* (Dod) Balogh (1: according to Luer 1975), *S. dendroneura* (Sheviak & Bye) Balogh (2) and *S. schlechteriana* Szlach. & Sheviak (3).

Distribution – Described and known only from the State of Chihuahua of Mexico (Fig. 28). Altitude 2400 m.

Note – Sheviak & Bye (1980) noticed that this species appears to be closely related to *Spiranthes valerioi* and *"S. parasitica"*. It clearly differs from both in the structure of the rostellum and shape of the lip. Its relationship with *Schiedeella schlechteriana* would seem more probable.

Schiedeella schlechteriana Szlach. & Sheviak (Fig. 29)

Rhodora **92**(869): 11–14. 1990. – Type: Guatemala, Totonicapan, Totonicapan, Empuxet, 2de abril de 1970, *Smith 559* (Holotype: F!).

Roots 3–4, 18–25 mm long, 4–5 mm ∅, clustered, fleshy, pubescent. Stem 60–80 mm high, 1.2–2.3 mm ∅ at base, 0.6–0.9 mm ∅ under inflorescence, erect, glabrous, above the highest bract glandular. Cauline bracts 5, longer than internodes, acute, multinerved, herbaceous with hyaline margins. Leaves lacking during blooming, at base of stem brown rests of petioles. Inflorescence 15–20 mm long, 2–3-flowered. Flowers tubular, white. Floral bracts 10 mm long, about 2 times longer than ovary, 3-nerved, oblong-lanceolate, acute, herbaceous, thin, semi-transparent. Ovary 5 mm long, erect, narrow, sparsely glandular. Dorsal sepal 6 mm long, 1.5 mm wide, broad lanceolate, acute, glabrous, 3-nerved. Lateral sepal 5.2 mm long, 1.3 mm wide, 1-nerved, oblong-lanceolate, acute, broadest at base, nearly symmetric, erect, glabrous. Petals 5 mm long, 1.2 mm wide, linear at base, spathulate above, acute, slightly sigmoid, on margins karbowane, 3-nerved. Lip distinctly divided, on short claw, in natural position straight, trough-shaped. Hypochile 3 mm long, 2.1 mm wide, rhombic-ovate, base rounded with small fleshy auricles directed towards the apex, near the center pubescent, side lobes more or less triangular, obtuse. No red thickening in the center. Isthmus rounded. Epichile 2 mm long, 2 mm wide, rounded, acute, papillate, minutely, irregular indented. Gynostemium 2 mm long, almost straight. Rostellum about 1 mm long, lanceolate. Viscidium about 1 mm long. Rostellum remnant 0.2 mm long.

Variability – No data.

Ecology – Found in *Agrostis exserta–Geranium alpicola* community. Blooms in IV.

Distribution – Known only from the type collection from Guatemala at an elevation of 3200 m (Fig. 28).

Note – Easily distinguished from all other species of the genus due to the fleshy appendages at the base of the hypochile directed towards the apex of the lip.

Schiedeella fragrans Szlach. (Fig. 30)

Fragm. Flor. Geobot. **36**(1): 18. 1991. – Type: Mexico, Chihuahua, part of Messa near Millsplace, 18 Jun 1891, *Hartman 706* (Holotype: US!; isotype: AMES!).

Roots single, 20–25 mm long, 4–6 mm ∅, cylindrical, fleshy. Stem 180–290 mm high, 1.5–2.0 mm ∅ at base, 0.8–1.1 mm ∅ under inflorescence, erect, rather delicate, glabrous, in upper part sparsely glabrous. Cauline bracts 8–10, more or less adnate to the stem, acute, herbaceous. Leaves lacking during blooming, not known. Inflorescence 40–90 mm long, 10–22-flowered, rather lax, spiral. Flowers rather small, campanulate opened, pale yellow, strong perfume. Floral bracts up to 10 mm long, more than 2 times longer than ovary, ovate-lanceolate, acute, thin, 3-nerved, herbaceous. Ovary 3.0–3.5 mm long, glandular at apex. Dorsal sepal 5.1 mm long, 1.5 mm wide, 1-nerved, broadly lanceolate, acute, glandular at base outside. Lateral sepals 4.8 mm long, 1 mm wide, 1-nerved, oblong-lanceolate, acute, arcuate at base, glandular outside. Petals 3.9 mm long, 0.9 mm wide, 1-nerved, linear-spathulate, acute, broadest in the upper part. Lip distinctly divided, on claw, in natural position boat-shaped, with epi-

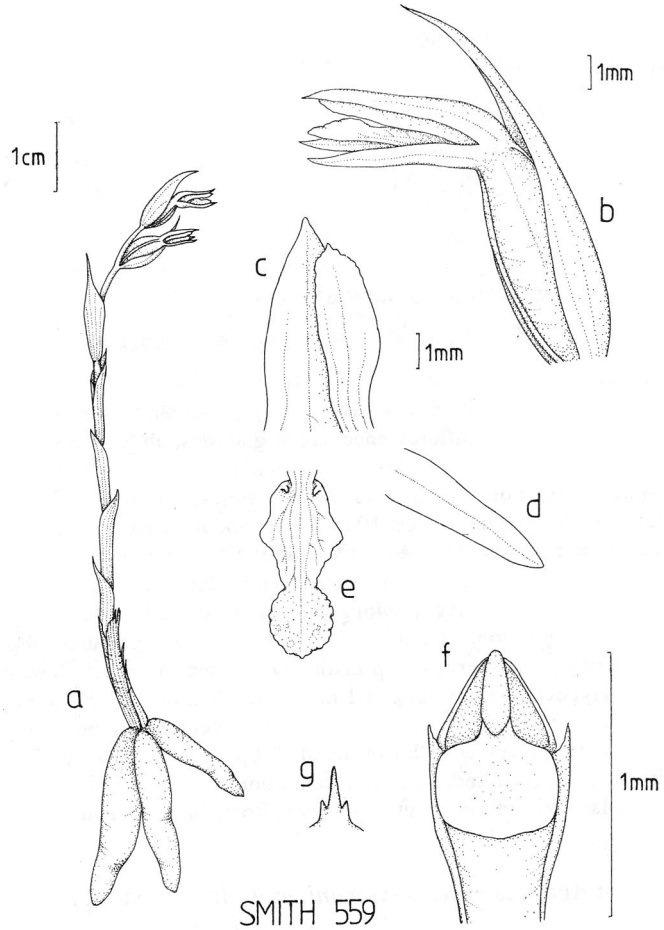

Fig. 29. *Schiedeella schlechteriana* Szlach. & Sheviak. a: habit; b: flower; c: galea; d: lateral sepal; e: lip; f: gynostemium with viscidium; g: rostellum remnant (drawn from holotype – F).

chile strongly down-turned. Hypochile 3 mm long, 1.9 mm wide, obovate, broadest at the apex, side lobes rounded, at base fleshy, ciliate auricles. Isthmus acute. Epichile 2.2 mm long, 2.7 mm wide, transversely oval, acute at apex, folded, minute indentations, densely papillate. Gynostemium 2.9 mm long, erect, only at base slightly arcuate. Rostellum ovate-subulate. Viscidium 0.3 mm long. Rostellum remnant 0.25 mm long.

Variability – No data.

Ecology – Meadows. Blooms in VI.

Distribution – Known only from the State of Chihuahua in Mexico.

Note – The herbarium sheet with the type of *Schiedeella fragrans* includes Ames's footnote from 1922 "...these specimens have no resemblance to *Spiranthes remantacea* (as initially determined – DLSz) but are similar to *S. luteo-alba*". According to Ames, the lip of *S. fragrans* is similar in shape to that of the type of this species drawn by Richard.

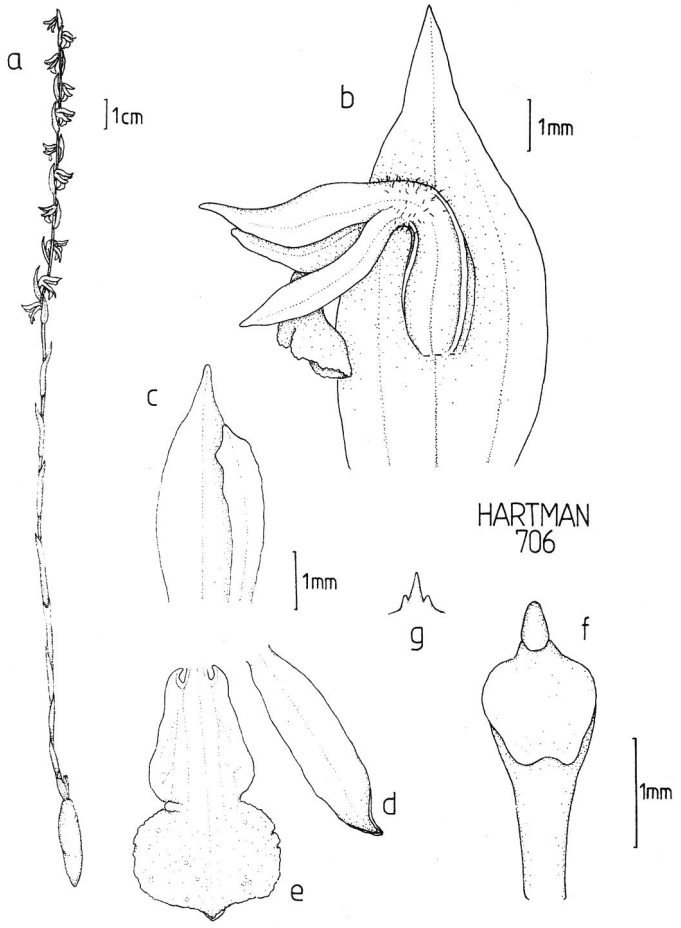

Fig. 30. *Schiedeella fragrans* Szlach. a: habit; b: flower; c: galea; d: lateral sepal; e: lip; f: gynostemium with viscidium; g: rostellum remnant (drawn from holotype – US).

As already mentioned, *S. luteo-alba* is undoubtedly a representative of the genus *Cyclopogon*, whereas *S. fragrans* has all features of the genus *Schiedeella*.

Section GEMMORCHIS Szlach., Fragm. Flor. Geobot. **36**(1): 19. 1991. Type: *Spiranthes fauci-sanguinea* Dod.

Lip strongly thickened in the center, red in colour. Rostellum remnant subulate, acute. It contains only a single species.

Schiedeella fauci-sanguinea (Dod) Burns-Balogh (Fig. 31)

Die Orchidee **40**(5): 173. 1989. – *Spiranthes fauci-sanguinea* Dod, Moscosoa **1**: 60. 1978. – Type: Republica Dominicana, Valle Nuevo, San Jose de Ocoa, 23 enero 1976, *Dod 618* (Holotype: SDM; isotypes: AMES!, NY!, SEL!, US!).

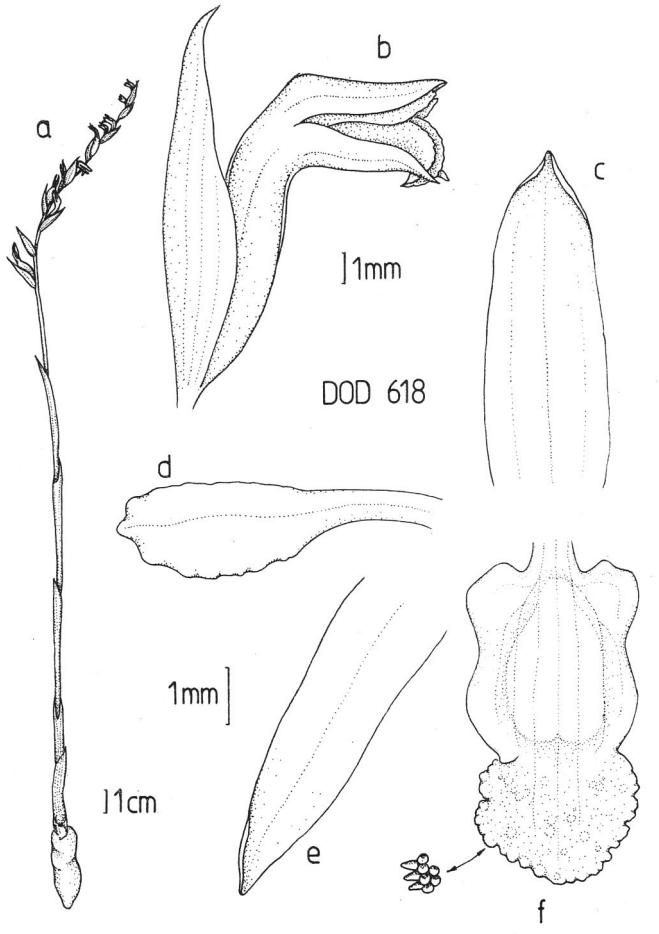

Fig. 31. *Schiedeella fauci-sanguinea* (Dod) Burns-Balogh. a: habit; b: flower; c: dorsal sepal; d: petal; e: lateral sepal; f: lip (drawn from type specimen of *Spiranthes fauci-sanguinea* Dod – AMES)

Roots 1–4, 10–40 mm long, 4.5–13.0 mm ∅, ovate, round or oblong, fleshy, white woolly pubescent. Stem 110–400 mm high, 0.9–2.1 mm ∅ at base, 0.5–1.9 mm ∅ under inflorescence, erect, slender, rather delicate, glabrous, inflorescence glandular. Cauline bract (3–)4–7(–9), acute, herbaceous, with hyaline margins. Leaves 1–4, lacking during blooming, petiolate; petiole 11–60 mm long, narrow; blade 10–60 mm long, (2.5–)10.0–38.0 mm broad, lanceolate to cordate-lanceolate or elliptic-oblong, widest near the middle or below, acute. Inflorescence (10–)30–100 mm long, (2–)4–10(–20)-flowered, lax, sometimes rather dense. Flower campanulate opened, white, pale-pink, with dark red thickened in the center of lip and dirty green nerves. Floral bracts 5–16 mm long, up to 1.5 times longer than ovary, 3–5-nerved, usually ovate-lanceolate, acute, thin, herbaceous with hyaline mergins. Ovary 3.5–10.0 mm long, erect, only at apex or whole glandular. Dorsal sepal 4.5–7.1 mm long, 1.2–2.5 mm wide, 1–3-nerved, ovate-lanceolate to oblong, acute to obtuse, at the base outside glandular. Lateral sepals 4.5–7.0 mm long, 1–2 mm wide, 1-, rarely 3-nerved, oblong to oblong-lanceolate, usually obtuse, sometimes acute, outside at base glandular. Petals 4.0–6.1 mm long, 0.7–1.2 mm wide, 1-nerved, spathulate to linear-spathulate, slightly sigmoid to arcuate, rarely straight, obtuse or acute, widest near the middle or above, minutely irregularly indented and/or ciliate on margins. Lip ditinctly divided, in natural position boat-shaped, with down-turned epichile. Hypochile 3.2–5.7 mm long, 1.9–4.0 mm wide,

about 1.5 times longer than broad, 5-nerved, usually distinctly lyre-like, to almostoval, broadest near the apex, at base two distinct or reduced fleshy auricles, a thick, red tissue composed of compact, closely cohering, polygonal cells with distinctly thickened cell walls in the center between vascular bundles. The upper epidermis has vesicular hairs concentrated mainly above the red tissue. The edges of the hypochile consist only of the upper and lower epidermis, the upper being more papillose. Air ducts in the central part of mesophyl. Isthmus usually acute. Epichile 1.4–3.0 mm long, 2–3 mm wide, 3-nerved, transverse oval or cordate, widest at base distinctly indented and plicate. Between upper and lower epidermis lax mesophyl with intercellular spaces and numerous air ducts. Mesophyll cells rounded. Upper epidermis papillose. Gynostemium 3.5–5.0 mm long, slightly arcuate, on ventral surface beneath stigma minutely ciliate. Viscidium 0.3–0.8 mm long, basal. Rostellum remnant 0.3–0.8 mm long. Anther 1.5–3.0 mm long, cordate-ovate. Pollen grains in tetrads.

Variability – Shape of the lip, number of flowers in inflorescence (Fig. 32).

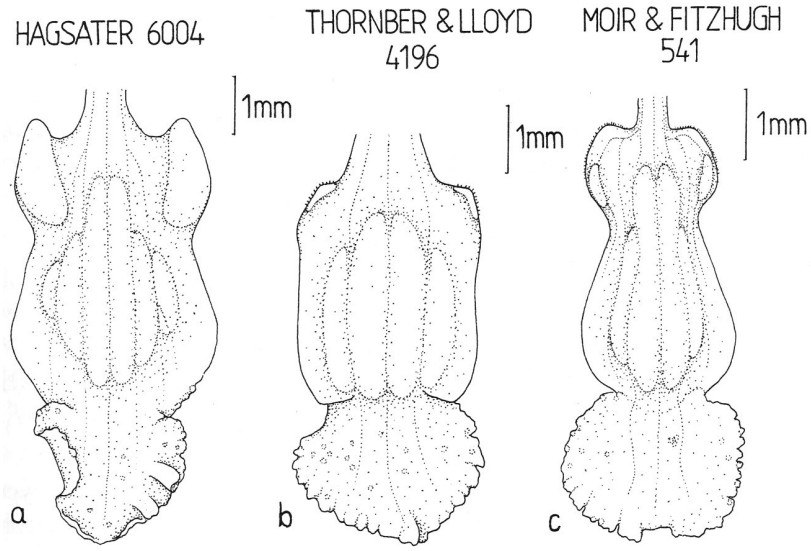

Fig. 32. Variability in the lip form of *Schiedeella fauci-sanguinea* (Dod) Burns-Balogh.

Ecology – Usually terrestrial, rarely epiphyte; dry slopes to wet shady places, meadows, pine and mixed forests, also cloud forest, in northern parts of area usually in shady places in mixed forests with *Pinus ponderosa*. Flowers in south in IV, in north V–VIII.

Distribution – Widely distributed in Mesoamerica: Mexico (Chiapas, Chihuahua, District Federal, Hidalgo, Jalisco, Mexico, Nueva Leon, Oaxaca, Puebla, Vera Cruz), Dominicana, Nicaragua, El Salvador, Honduras, Costa Rica, and the Unites States (New Mexico, Arizona, Texas) (Fig. 28). Herbarium specimens of *"Spiranthes parasitica"* from Costa Rica I have seen were wrongly determined *Funkiella stolonifera*. Altitude 2100–3200 m.

Specimens examined – UNITED STATES. **ARIZONA**. Graham Co., along road just E of turnoff to Hospital Flat campground, Mt. Graham, *Sheviak 2639* (NYS); Cochise Co., along Oninion Saddle – Pustler Park Road, E slope just below ridge of Chiricahua Mts., *Todsen s.n.* (US); Santa Catalina

Mts., Marshall Gulch, *Thornber & Lloyd 4196* (US). **NEW MEXICO**. Sierra Co., N facing slope, small canyon 1/2 mi S of Emory Pass, Black range, *Todsen s.n.* (NMSU); Mogollon Mts., Bearwallow Mt., E aspect, upper slope, *Moir & Fitzhugh 541* (NMSU); Grant Co., N slope of Sigual Peak, Pinos Altos Mts., 2 mi S of Redstone Cabin, *Todsen s.n.* (NMSU); Otero Co., NE slope at head of Sixteen Springs Canyon, Sacramento Mts., *Todsen s.n.* (US); Grant Co., Wright Cabin Canyon, Black Range, on E facing slope, *Todsen s.n.* (NMSU); item, but ... 33 mi E of Silver City on St. Hwy 90, *Hess 1975* (NMSU); Lincoln Co., White Mts., Eagle Creek Canyon, 0,4 miles NW just hwy 532 with Forest Rd. 127, *Worthington 12201* (SEL).

MEXICO. **HIDALGO**. E of Mine "El Chico" near Pachuca, long. 95º14'W, lat. 20º14'N, *Juan Gonzales 2189* (US). **VERA CRUZ**. Lomogrande near Mt. Orizaba, *Balls 4348* (BM, EDA, US);

NICARAGUA. Sine loco et dato, *Heller 24910* (SEL).

EXCLUDED SPECIES

Schiedeella albovaginata (Schweinf.) Balogh, Orquidea (Mex.) **8**(1): 38. 1981 ≡ ***Stenorrhynchos albovaginata*** (Schweinf.) Szlach., *comb. nov.* [*Spiranthes albovaginata* Schweinf., Bot. Mus. Leafl. Harv. Univ. **4**: 103. 1937. – Type: Mexico, near Chalma, 20 Apr 1933, *Juan G. 2267* (Holotype: AMES!; isotypes: MO!, US!)].

Schiedeella chartacea (L. O. Williams) Burns-Balogh, Orquidea (Mex.) **10**(1): 92. 1986 ≡ ***Oestlundorchis chartacea*** (L. O. Williams) Szlach., Fragm. Flor. Geobot. **36**(1): 28. 1991 [*Spiranthes chartacea* L. O. Williams, Bot. Mus. Leafl. Harv. Univ. **12**: 226. 1946. – Type: Mexico, Jalisco, Barranca del Laurel, 8 Mar 1936, *Navarro & Nagel 5419* (Holotype: AMES!); paratype 25 Feb 1936, *Navarro & Nagel 5408* – AMES!)].

Schiedeella chloraeformis (A. Rich. & Gal.) Balogh, Orquidea (Mex.) **8**(1): 38. 1981 [*Spiranthes chloraeformis* A. Rich. & Gal., Ann. Sci. Nat. Bot. Sér. 3, **3**: 33. 1845. – Type: Mexico, Oaxaca, Cordillera, Nov-Apr 1840, *Galeotti 5008* (Holotype: P!; isotype: W!)] = ***Burnsbaloghia diaphana*** (Lindl.) Szlach., Folia Phytotax. Geobot. **26**(4): 400. 1991.

Schiedeella congestiflora (L. O. Williams) Balogh, Orquidea (Mex.) **8**(1): 38. 1981 ≡ ***Funkiella congestiflora*** (L. O. Williams) Garay, Bot. Mus. Leafl. Harv. Univ. **28**(4): 320. 1982 [*Spiranthes congestiflora* L. O. Williams, Bot. Mus. Leafl. Harv. Univ. **12**: 227. 1946. – Type: Mexico, Michoacan, Morelia, 9 May 1912, *Arsène 9026* (Holotype: US!)].

Schiedeella cobanensis (Schlecht.) Schlecht., Beih. Bot. Centralbl. **37**: 380. 1920 [*Spiranthes cobanensis* Schlecht., Beih. Bot. Centralbl. **36**: 377. 1918. – Type: Guatemala, bei Coban, *Lehmann s.n.* (Holotype: B†; iconotype: AMES!)] = ***Deiregyne pyramidalis*** (Lindl.) Burns-Balogh, Orquidea (Mex.) **10**(1): 92. 1986.

Schiedeella densiflora (Schweinf.) Balogh, Orquidea (Mex.) **8**(1): 39. 1981 ≡ ***Stenorrhynchos densiflora*** (Schweinf.) Szlach., *comb. nov.* [*Spiranthes densiflora* Schweinf., Bot. Mus. Leafl. Harv. Univ. **4**4: 104–105. 1937. – Type: Mexico, Morelos, Tepeyte, 10 Oct 1932, *Carbonero 1513* (Holotype: AMES!)].

Schiedeella diaphana (Lindl.) Burns-Balogh & Greenw. *ex* Burns-Balogh, Orquidea (Mex.) **10**(1): 93. 1986 ≡ ***Burnsbaloghia diaphana*** (Lindl.) Szlach., Folia Phytotax. Geobot. **26**(4): 400. 1991 [*Spiranthes diaphana* Lindl., Bot. Reg. 30, Misc. 12, 1844. – Type: *Jones s.n.* (Holotype: K-L! – photo; isotype: W-R?)].

Schiedeella durangensis (Ames & Schweinf.) Balogh, Orquidea (Mex.) **10**(1): 93. 1986 ≡ ***Funkiella durangensis*** (Ames & Schweinf.) Szlach., Fragm. Flor. Geobot. **36**(1): 20. 1991 [*Spiranthes durangensis* Ames & Correll, Bot. Mus. Leafl. Harv. Univ. **3**: 128. 1935. – Type: Mexico, Durango, from near El Salto, 12 Jul 1898, *Nelson 4545* (US!)].

Schiedeella eriophora (Rob. & Greenm.) Schlecht., Beih. Bot. Centralbl. **37**(2): 380. 1920 ≡ ***Oestlundorchis eriophora*** (Rob. & Greenm.) Szlach., Fragm. Flor. Geobot. **36**(1): 30. 1991 [*Spiranthes eriophora* Rob. & Greenm., Amer. J. Sci. **3**(50): 165. 1895. – Type: Mexico, Oaxaca, Sierra de San Felipe, 31 May 1894, *Pringle 4682* (Holotype: GH; isotypes: BM!, EDA!, G!, K!, MO!, NY!, P!, US!, WU!)].

Schiedeella falcata (L. O. Williams) Balogh, Orquidea (Mex.) **8**(1): 39. 1981 ≡ ***Oestlundorchis falcata*** (L. O. Williams) Szlach., Fragm. Flor. Geobot. **36**(1): 30. 1991 [*Spiranthes falcata* L. O. Williams, Bot. Mus. Leafl. Harv. Univ. **12**: 228. 1946. – Type: Mexico, Durango to Chihuahua, between Guanacevi et Guadelupe y Calvo, 24 Feb 1936, *Juan G. 5023* (Holotype: AMES!; isotype: SEL! – photo)].

Schiedeella hyemalis (A. Rich. & Gal.) Balogh, Orquidea (Mex.) **8**(1): 39. 1981 ≡ ***Funkiella hyemalis*** A. Rich. & Gal.) Schlecht., Beih. Bot. Centralbl. **37**(2): 430. 1920. [*Spiranthes hyemalis* A. Rich. & Gal., Ann. Sci. Nat. Bot. Sér. 3, **3**: 32. 1845. – Type: Mexico, Michoacan, near Angangueo, *Schiede 5200* (Holotype: P!)].

Schiedeella michoacana (Llave & Lex.) Balogh, Orquidea (Mex.) **8**(1): 39. 1981 ≡ ***Stenorrhynchos michoacana*** (Llave & Lex.) Lindl., Gen. Spec. Orch. Pl. 480. 1840 [*Neottia michoacana* Llave & Lex., Nov. Veg. Descr. **2**: Orch. Opusc. 3. 1825. – Type: In Mexico, juxta Vallisoletum praecipue versus Jesus-del-Monte, Llave (unknown)].

Schiedeella muscicola (Garay & Dunsterv.) Garay & Dunsterv., Orchid. Ven. **3**: 915. 1979 ≡ ***Stalkya muscicola*** (Garay & Dunsterv.) Garay, Bot. Mus. Leafl. Harv. Univ. **28**(4): 372. 1982 [*Spiranthes muscicola* Garay & Dunsterv., Ven. Orchid. Ill. **4**: 280. 1966. – Type: Venezuela, Pregonero Road, near Merida, *Garay s.n.* (Holotype: AMES!)].

Schiedeella nonantzin (Tamayo *ex* McVaugh) Tamayo, Orquidea (Mex.) **11**: 271. 1988 ≡ ***Oestlundorchis nonantzin*** (Tamayo *ex* McVaugh) Szlach., Fragm. Flor. Geobot. **36**(1): 27. 1991 [*Spiranthes nonantzin* Tamayo *ex* McVaugh, Fl. Novo-Gal. Orchid. 326. 1985. – Type: Mexico, Jalisco, between Los Pericos and Caule, *Tamayo 1197* (Holotype: "in Tamayo herbarium")].

Schiedeella obtecta (Schweinf.) Balogh, Orquidea (Mex.) **8**(1): 39. 1981 ≡ ***Oestlundorchis obtecta*** (Schweinf.) Szlach., Fragm. Flor. Geobot. **36**(1): 30. 1991 [*Spiranthes obtecta* Schweinf., Bot. Mus. Leafl. Harv. Univ. **4**: 106. 1937. – Type: Guatemala, road to Metaquescuintla, 21 Apr 1934, *Lewis 101* (Holotype: AMES!)].

Schiedeella pseudopyramidalis (L. O. Williams) Balogh, Orquidea (Mex.) **8**(1): 39. 1981 ≡ ***Oestlundorchis pseudopyramidalis*** (L. O. Williams) Szlach., Fragm. Flor. Geobot. **36**(1): 30. 1991 [*Spiranthes pseudopyramidalis* L. O. Williams, Bot. Mus. Leafl. Harv. Univ. **12**: 232–233. 1946. – Type: Mexico, Oaxaca, Cerro San Felipe, 24 Mar 1934, *Nagel 3743* (Holotype: AMES!)].

Schiedeella pubicaulis (L. O. Williams) Balogh, Orquidea (Mex.) **8**(1): 39. 1981 ≡ ***Lyroglossa pubicaulis*** (L. O. Williams) Garay, Bot. Mus. Leafl. Harv. Univ. **28**(4): 333. 1982 [*Spiranthes pubicaulis* L. O. Williams, Bot. Mus. Leafl. Harv. Univ. **12**: 234. 1946. – Type: Mexico, Vera Cruz, "Jaltipan", 5 Jul 1910, *Orcutt 5056* (Holotype: STAN)].

Schiedeella pyramidalis (Lindl.) Schlecht., Beih. Bot. Centralbl. **37**: 381. 1920 ≡ ***Deiregyne pyramidalis*** (Lindl.) Burns-Balogh, Orquidea (Mex.) **10**(1): 92. 1986 [*Spiranthes pyramidalis* Lindl., Gen. Sp. Orch. Pl. 473. 1840. – Type: Guatemala, *Skinner s.n.* (Holotype: K-L! – photo)].

Schiedeella rubrocalosa (Rob. & Greenm.) Balogh, Orquidea (Mex.) **8**(1):39. 1981 ≡ ***Galeottiella rubrocallosa*** Rob. & Greenm.) Szlach., Fragm. Flor. Geobot. **35**(1–2): 64. 1991 [*Spiranthes rubrocalosa* Rob. & Greenm., Amer. J. Sci. **3**(50): 165. 1895. – Type: Mexico, Chihuahua, Sierra Madre, Oct 1887, *Pringle 1373* (Holotype: US!; isotypes: F!, NY!, US!, WU!)].

Schiedeella rosilloi Tamayo, *nom. nud.*

Schiedeella saltensis (Ames) Schlecht., Beih. Bot. Centralbl. **37**(2): 381. 1920 [*Spiranthes saltensis* Ames, Orchidaceae **2**: 258. 1908, *non* Grisebach 1879. – Type: Mexico, Durango, from near El Salto, 12 Jul 1898, *Nelson 4545* (Holotype: US!)] = ***Funkiella durangensis*** (Ames & Schweinf.) Szlach., Fragm. Flor. Geobot. **36**(1): 20. 1991.

Schiedeella sparsiflora (Schweinf.) Balogh, Orquidea (Mex.) **8**(1): 40. 1981 ≡ ***Physogyne sparsiflora*** (Schweinf.) Garay, Bot. Mus. Leafl. Harv. Univ. **28**(4): 347. 1982 [*Spiranthes sparsiflora* Schweinf., Bot. Mus. Leafl. Harv. Univ. **4**: 108. 1937. – Type: Mexico, Morelos, Chapultepec, 17 Mar 1933, *Nagel 1554* (Holotype: AMES!)].

Schiedeella stolonifera (Ames & Correll) Balogh, Orquidea (Mex.) **8**(1): 40. 1981 ≡ ***Funkiella stoloniflora*** (Ames & Correll) Garay, Bot. Mus. Leafl. Harv. Univ. **28**(4): 320. 1982 [*Spiranthes stolonifera* Ames & Correll, Bot. Mus. Leafl. Harv. Univ. **10**: 63. 1942. – Type: Guatemala, Dept. Huehuetenango, Sierra Cuchumatanes, 23 Aug 1934, *Skutch 1094* (Holotype: AMES!)].

Schiedeella tenella (L. O. Williams) Balogh, Orquidea (Mex.) **8**(1): 40. 1981 ≡ ***Funkiella durangensis*** (Ames & Schweinf.) Szlach. subsp. ***tenella*** (L. O. Williams) Szlach., Fragm. Flor. Geobot. **36**(1): 20. 1991 [*Spiranthes tenella* L. O. Williams, Bot. Mus. Leafl. Harv. Univ. **12**: 235. 1946. – Type: Mexico, Chihuahua, near Guadelupe y Calvo, 13 Apr 1936, *Juan G. 5027* (Holotype: AMES!)].

Schiedeella velata (Rob. & Fern.) Schlecht., Beih. Bot. Centralbl. **37**(2): 382. 1920 ≡ ***Oestlundorchis velata*** (Rob. & Fern.) Szlach., Fragm. Flor. Geobot. **36**(1): 25. 1991 [*Spiranthes velata* Rob. et Fern., Proc. Am. Acad. **30**: 122. 1894. – Type: Mexico, Chi-

huahua, Canon near Canon de Los Alamos, 28 Jun 1891, *Hartman 710* (Holotype: US!; isotypes: K!, NY!)].

Schiedeella violacea (A. Rich. & Gal.) Garay, Bot. Mus. Leafl. Harv. Univ. **28**(4): 358. 1982 ≡ ***Cyclopogon violaceus*** (A. Rich. & Gal.) Schlecht. [*Spiranthes violacea* A. Rich. & Gal., Ann. Sci. Nat. Bot. Sér. 3, **3**: 32. 1845. – Type: Mexico, Vera Cruz, Cordillera, 1840, *Galeotti 5120* (Holotype: P!)].

Acknowledgements. I am grateful to the curators of AMO, BM, EDA, F, G, IEB, K, L, MO, NMSU, NY, P, SEL, UPS, W and WU for loan of the herbarium materials and to the curators of AMES, NYS and US for their hospitality during my personal visits in their herbaria. I would like to thank Prof. dr hab. Hanna Piotrowska, Prof. dr Jan Kornaś, Prof. dr hab. Waldemar Żukowski, dr Ryszard Markowski, dr hab. Wiesław Fałtynowicz and dr Józef Szmeja for reviewing the manuscript and their comments.

REFERENCES

AMES O. 1922. Orchidaceae. **7**. IX + 174 pp., pls. 102–114. Merrymount Press, Boston.

AMES O. & CORRELL D. S. 1952. Orchids of Guatemala. – Fieldiana, Botany **26**: 1–727.

AMES O. & SCHWEINFURTH C. 1930. New or noteworthy orchids. – Sched. Orchid. **10**: 1–146.

BALOGH P. 1981. Notas sobre nomenclatura del genero *Schiedeella*. – Orquidea (Mex.) **8**(1): 37–40.

BURNS-BALOGH P. 1982. Generic redefinition in the subtribe Spiranthinae (Orchidaceae). – Am. J. Bot. **69**: 1119–1132.

BURNS-BALOGH P. 1986. A synopsis of Mexican Spiranthinae. – Orquidea (Mex.) **10**(1): 76–96.

BURNS-BALOGH P. 1988. Monographia del genero *Deiregyne* Schltr. (Orchidaceae). – Orquidea (Mex.) **11**: 131–201.

BURNS-BALOGH P. 1989. *Svenkoeltzia*, eine neue Gattung aus Mexiko. – Die Orchidee **40**(1): 11–16.

GARAY L. A. 1982. A generic revision of the Spiranthinae. – Bot. Mus. Leafl. Harv. Univ. **28**(4): 277–425.

GREUTER W. (Chairman). 1988. International Code of Botanical Nomenclature adopted by the Fourteenth International Botanical Congress, Berlin, July – August 1987. – Reg. Veg. **118**: XIV + 1–328. Koeltz Scientific Books, Königstein.

HAMER F. 1984. Orchids of Nicaragua. 5. – Icon. Pl. Trop. **12**: 1101–1200.

HAMER F. 1985. Orchids of Nicaragua. 6. – Icon. Pl. Trop. **13**: 1201–1300.

HOLMGREN P., HOLMGREN, N. H. & BARNETT L. C. 1990. Index Herbariorum. Part I: The herbaria of the world. – Reg. Veg. **120**: I–X + 1–693. The New York Botanical Garden, Bronx, New York.

LUER A. 1975. Orchids of the United States and Canada, excluding Florida. 361 pp. The New York Botanical Garden, Bronx, New York.

MCVAUGH R. 1985. Orchidaceae. – In: W. R. ANDERSON (ed.), Flora Novo-Galiciana. **16**. 363 pp. University of Michigan Press, Ann Arbor.

SCHLECHTER R. 1920. Versuch einer systematischen Neuordnung der Spiranthinae. – Beih. Bot. Centralbl. **37**(2): 317–454.

SCHLECHTER R. 1931. Blutenanalysen neuer Orchidaceen. II. Mittelamerikanische Orchideen. – Repert. Spec. Nov. Reg. Veg. Beih. **59**(2): 1–8 + 81 pls.

SHEVIAK C. J. & BYE A. 1980. *Spiranthes dendroneura*, a new species from Chihuahua. – Brittonia **32**(3): 368–371.

SZLACHETKO D. L. 1991a. *Oestlundorchis* (Orchidaceae, Spiranthinae), a new orchid genus from Mesoamerica. – Fragm. Flor. Geobot. **36**(1): 23–31.

SZLACHETKO D. L. 1991b. Notes on the genera *Schiedeella* and *Funkiella* (Orchidaceae, Spiranthinae). – Fragm. Flor. Geobot. **36**(1): 13–21.

WILLIAMS L. O. 1951. The Orchidaceae of Mexico. – Ceiba **2**: 1–321.

STRESZCZENIE

Rodzaj *Schiedeella* Schlecht. obejmuje 10 gatunków rosnących w Ameryce Środkowej – od południowych stanów USA po Kostarykę. Są to rośliny niewielkich rozmiarów, o drobnych, niepozornych kwiatach, pozbawione zwykle liści podczas kwitnienia. Ich łodygi pokryte są zielnymi pochwami. Kwiatostany liczą zwykle od kilku do kilkanastu kwiatów, wspartych zielnymi przysadkami. Warżka osadzona na krótkim paznokciu, zaopatrzona jest u nasady w dwa mięsiste, wolne u szczytu wyrostki. Prętosłup, wysmukły i delikatny, jest lekko łukowato wygięty; stopa kolumny jest silnie zredukowana. Środkowa łatka znamienia, tworząca u storczyków tzw. rostellum, jest wąska, lancetowata i ostro zakończona. Wytwarza półpochwiasty uczepek.

Podobnie jak niemal wszystkie rodzaje podplemienia Spiranthinae, także *Schiedeella* łączona była ze *Spiranthes* L. C. Rich. przez większość badaczy amerykańskich. W roku 1982 ukazały się dwie, niezależnie przygotowane rewizje taksonomiczne tego podplemienia, w których autorzy – Burns-Balogh i Garay – zaproponowali odmienne koncepcje wielu rodzajów, w tym również *Schiedeella.* Rezultaty niniejszej rewizji są w większym stopniu zbieżne z koncepcją Garaya niż Burns-Balogh. Rodzaj *Schiedeella* został podzielony na dwa podrodzaje i dwie sekcje.