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Preliminary checklist of the Chaco. Example of the Acanthaceae. Contribution to the study of the flora and vegetation of the Chaco. IV.

RAOUL PALESE
PATRICK PERRET
CATHERINE ZELLWEGER
LORENZO RAMELLA
&
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ABSTRACT

PALESE, R., P. PERRET, C. ZELLWEGER, L. RAMELLA & R. SPICHIGER (1991). Preliminary checklist of the Chaco. Example of the Acanthaceae. Contribution to the study of the flora and vegetation of the Chaco. IV. *Candollea* 46: 565-578. In English, English and Spanish abstracts.

The project of a preliminary checklist of the Chaco is entering its active phase. This checklist is specimen-based and a result of the integrated database system set up at the "Conservatoire et Jardin botanique de la Ville de Genève" (CJB). The first part of this paper describes the methodology. The second part shows — illustrated by the example of the *Acanthaceae* — the potentials of the database system, and different formats for editing the information are exposed.

RESUMEN

PALESE, R., P. PERRET, C. ZELLWEGER, L. RAMELLA & R. SPICHIGER (1991). Checklist preliminar del Chaco. Ejemplo de las Acanthaceae. Contribución al estudio de la flora y de la vegetación del Chaco. IV. *Candollea* 46: 565-578. En inglés, resúmenes en inglés y en español.

El proyecto de checklist preliminar del Chaco entró en su fase activa. Basada en especímenes de herbario, esta checklist es producto de la base de datos integrados instalada en el "Conservatoire et Jardin botaniques de la Ville de Genève" (CJB). En la primera parte del artículo se presenta la metodología. Luego, tomando como ejemplo la familia *Acanthaceae*, se exponen algunas de las potencialidades de la base de datos así como varias formas de presentación de la información.

Introduction

The project of a preliminary checklist of the Chaco was discussed in a former paper (ZELLWEGER & al., 1990). This paper is the result of the realization of the integrated database system at the CJB. This preliminary checklist, based on herbarium specimens, is the first step of the realization of an information system on the flora of the Chaco region. Validated and standardized taxonomic, chorologic and bibliographic information is processed in order to provide checklist users with a variety of working tools corresponding to their requirements. This paper shows examples of the use of the database system for the family *Acanthaceae*. These examples are not complete but serve as an illustration of the potentials of the information system set up at the CJB.

Specimen processing

The specimens of Geneva's herbarium are the only collection now processed for the preliminary checklist of the Chaco. They are extracted from the herbarium, family by family. This operation must be completed by a specific management of the specimens' flow in and out of the herbarium.

The information of each specimen is entered in the integrated database system through the use of specific applications. The data entry forms allow the user to interactively validate the data by access to thesauri (authors abbreviations; collectors and determinators names; locality names; scientific names) according to the classes of data as defined by ZELLWEGER & al. (1990). The elements of information are either selected in the thesauri or added if new. The names of persons and the scientific names are entered as indicated on the labels and validated subsequently (the nomenclature will be discussed further below).

The addition of a new locality name implies further searching. The locality name is checked on a reference map and the coordinates (latitude and longitude) are entered. For Argentina and Bolivia the reference maps are the following: *Carta Provisional de la República Argentina*, Ejército Argentino, Instituto Geográfico Militar. 1:500.000; *América del Sur (Bolivia)*, Instituto Geográfico Militar, La Paz — Bolivia. 1:250.000. As concerns the Paraguayan part of the Chaco, the electronic gazetteer established for the "Flora del Paraguay" project is the reference. The expertise at the gazetteer level is essential. Only reliable and standardized data may be used for cartography.

Nomenclature processing

The nomenclature is the means of communication (JEFFREY, 1989). Particular attention is thus given to the names used in the checklist. Providing reliable nomenclature to the users, i.e. in accordance with the rules, verified and standardized, is one of the capital goals of the project.

Names extracted from the specimens (labels and determinants) constitute the basic list. Without taking into account the problems linked to correct or incorrect determinations, the first step consists in verifying the spelling, the validity and the legitimacy of the names composing the basic list. This step is identical to the one taken within the framework of the Med-Checklist Project (GREUTER & al., 1984-). In most cases, this analysis may go as far back as the original publication as a result of the important resources of the CJB library. The missing references are searched for in other libraries. If required, details such as: *nom. inval. (nomen invalidum)*, *nom. illeg. (nomen illegitimum)*, mention of prior homonyms, and basionyms or replaced synonyms are being added. The list is thus added to on a strictly nomenclatural basis.

The second step consists in standardizing the nomenclatural citations (authors' abbreviations and bibliographic references). The authors' abbreviations are based on "Draft index of author abbreviations" (MEIKLE, 1984). The periodicals' names have been standardized according to the "Botanico-Periodicum-Huntianum", whereas the titles of books are classified in accordance with "TL-2" (STAFLEU & COWAN, 1976-1988).

Furthermore, it is within the framework of this nomenclatural expertise that a basic bibliography for the groups concerned is being established.

Taxonomic treatment

Once the additions have been made to the basic list, the checklist is established according to a taxonomic concept which in turn originates from either literature or determinators (specialists) sources.

As concerns literature, a taxonomic concept is chosen as a starting point. It reflects the state of knowledge at a given moment and evolves through new monographic and regional floristic studies. This treatment can only be applied to specimens with reliable determination. The assessment of specialists is thus essential.

Results

The CJB database system, based on a relational model, provides access to information by the intermediary of views. Each of these has been elaborated in order to satisfy the requirements of the users. CJB collaborators may do research and obtain information interactively, directly via the screen and the information thus obtained may be printed as maps or text.

- *Maps*: a compatible personal computer fitted with a map-making programme elaborated at the CJB and based on AUTOCAD software allows the creation of maps. Queries concerning database are made, thus constituting a file containing selected information as well as coordinates of each respective locality. This file is then introduced into the PC via the local network and the exact points are marked out on the reference map previously digitalized. The maps appearing on the screen may be printed on the plotter. The reference maps are based on following maps: *South America, North West* (1st. edition, 1986-1987). ITM Productions n° 153; *South America, South* (1st. edition, 1990-1991). ITM Productions n° 155.
- *Text*: the results of the queries of the database are automatically transmitted to the word processor. At any moment and according to updating, a specific query may be carried out in order to obtain the latest up to date information.

Figures illustrating some possibilities of extractions are proposed on following pages

Figure 1. — Preliminary checklist of the Chaco *Acanthaceae*. Names deriving from specimens are indicated by a *.

Figure 2. — List of specimens of *Ruellia brevifolia* (Pohl) Ezcurra, with consecutive determinants.

Figure 3. — Gathering map of the *Dicliptera* A. L. Juss. genus. Gathering localities are either precise (●), or approximate (○).

Figure 4. — Gathering map of one particular species, *Siphonoglossa sulcata* (Nees) Lindau, as well as a description of the gathering localities. Each locality bears the mention precise (P) or approximate (A).

Fig. 5. — Gathering map of one particular species, *Ruellia tweediana* Griseb., with *specimina visa*.

Fig. 6. — Gathering map of the *Acanthaceae* by R. Spichiger, as well as a list of specimens.

Figure 1. — *Acanthaceae* Regionis Chacoënsis

Anisacanthus Nees in *Linnaea* 16: 307. 1842.

- * *Anisacanthus boliviensis* (Nees) Wassh., in hoc loco inval.
= *Drejera boliviensis* Nees in A. DC., Prodr. 11: 334. 1847.
- * *Anisacanthus caducifolius* (Griseb.) Lindau in Bot. Jahrb. Syst. 19, Beibl. 48: 18. 1894.
= *Jacobinia caducifolia* Griseb. in Abh. Königl. Ges. Wiss. Göttingen 24: 261. 1879.

Aphelandra R. Br., Prodr.: 475. 1810.

- * *Aphelandra hieronymi* Griseb. in Abh. Königl. Ges. Wiss. Göttingen 24: 260. 1879.

Beloperone Nees in Wallich, Pl. Asiat. Rar. 3: 76. 1832.

- * *Beloperone riparia* S. Moore in Trans. Linn. Soc. London, Bot. 4: 432. 1895.
- * *indet.*

Chaetochlamys Lindau in Bull. Herb. Boissier 3: 490. 1895.

- * *indet.*

Chaetothylax Nees in C. Martius, Fl. Bras. 9: 153. 1847.

- * *Chaetothylax boliviensis* Lindau in Bull. Herb. Boissier 3: 492. 1895.
- * *Chaetothylax umbrosus* Nees in A. DC., Prodr. 11: 313. 1847.
- * *indet.*

Dicliptera A. L. Juss. in Ann. Mus. Natl. Hist. Nat. 9: 267. 1807.

- * *Dicliptera jujuyensis* Lindau in Ark. Bot. 1: 398. 1903.
- * *Dicliptera niederleiniana* Lindau in Bot. Jahrb. Syst. 19, Beibl. 48: 18. 1894.
= *Dicliptera tomentosa* Griseb. in Abh. Königl. Ges. Wiss. Göttingen 19: 226. 1874 [non (M. Vahl) Nees in A. DC., Prodr. 11: 481. 1847].
- * *Dicliptera pohliana* Nees in C. Martius, Fl. Bras. 9: 162. 1847.
- * *Dicliptera scutellata* Griseb. in Abh. Königl. Ges. Wiss. Göttingen 19: 226. 1874.
- * *Dicliptera tomentosa* (M. Vahl) Nees in A. DC., Prodr. 11: 481. 1847.
= *Justicia tomentosa* M. Vahl, Enum. Pl. 1: 160. 1804.
- * *Dicliptera tweediana* Nees in A. DC., Prodr. 11: 482. 1847.
- * *indet.*

Dyschoriste Nees in Wallich, Pl. Asiat. Rar. 3: 75. 1832.

- * *Dyschoriste ciliata* (Nees) Kuntze, Revis. Gen. Pl. 1: 486. 1891.
= *Calophanes ciliatus* Nees in A. DC., Prodr. 11: 110. 1847.
- * *Dyschoriste humilis* Lindau in Bot. Jahrb. Syst. 19, Beibl. 48: 15. 1894.

Eranthemum L., Sp. Pl.: 9. 1753.

- * *Eranthemum nervosum* (M. Vahl) R. Br. in Roemer & Schultes, Syst. Veg. 1: 174. 1817.
= *Justicia nervosa* M. Vahl, Enum. Pl. 1: 164. 1804.

Hygrophila R. Br., Prodr.: 479. 1810.

(Figure 1 continued)

- * *Hygrophila guianensis* Nees in London J. Bot. 4: 634. 1845.
 - * = *Hygrophila longifolia* Nees in C. Martius, Fl. Bras. 9: 21. 1847 [nom. illeg.].
 - * *Hygrophila pubescens* Nees in A. DC., Prodr. 11: 88. 1847.
- Justicia* L., Sp. Pl.: 15. 1753.
- * *Justicia albomarginata* (Lindau) V. Graham in Kew Bull. 43: 606. 1988.
 - * = *Beloperone albomarginata* Lindau in Bull. Herb. Boissier ser. 2, 5: 373. 1905.
 - * *Justicia brasiliana* Roth, Nov. Pl. Sp.: 17. 1821.
 - * = *Beloperone amherstiae* Nees in Wallich, Pl. Asiat. Rar. 3: 102. 1832.
 - * *Justicia campestris* Griseb. in Abh. Königl. Ges. Wiss. Göttingen 19: 225. 1874.
 - * = *Justicia lorentziana* Lindau in Bot. Jahrb. Syst. 19, Beibl. 48: 20. 1894 [nom. illeg.].
 - * *Justicia comata* (L.) Lam., Encycl. 1: 632. 1785.
 - * = *Dianthera comata* L., Syst. Nat. ed. 10: 850. 1759.
 - * *Justicia dumentorum* Morong in Ann. New York Acad. Sci. 7: 193. 1893.
 - * *Justicia echegarayi* Hieron. in Bol. Acad. Nac. Ci. 4: 61. 1881.
 - * *Justicia kuntzei* Lindau in Bull. Herb. Boissier 3: 483. 1895.
 - * *Justicia laevilinguis* (Nees) Lindau in Bot. Jahrb. Syst. 19, Beibl. 48: 20. 1894.
 - * = *Rhytiglossa laevilinguis* Nees in C. Martius, Fl. Bras. 9: 120. 1847.
 - * *Justicia leonardii* De Marco & T. Ruiz in Publ. Espec. Inst. Lillo: 50. 1976 [non Wassh. in Bailey 19: 3. 1973].
 - * = *Justicia nemoralis* Lillo in Lilloa 1: 58. 1937 [nom. inval.].
 - * *Justicia lucens* Hiern in Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn ser. 3, 9-10: 80. 1877.
 - * = *Leptostachya lucida* Nees in C. Martius, Fl. Bras. 9: 149. 1847 [non *Justicia lucida* Andrews in Bot. Repos.: tab. 313. 1803].
 - * *Justicia obtusifolia* (Nees) Lindau in Bot. Jahrb. Syst. 19, Beibl. 48: 20. 1894.
 - * = *Rhytiglossa obtusifolia* Nees in C. Martius, Fl. Bras. 9: 120. 1847.
 - * *Justicia odonellii* De Marco & T. Ruiz in Publ. Espec. Inst. Lillo: 53. 1976.
 - * = *Justicia tucumanensis* Lillo in Lilloa 1: 59. 1937 [nom. inval.].
 - * *Justicia oranensis* De Marco & T. Ruiz in Publ. Espec. Inst. Lillo: 46. 1976.
 - * = *Justicia schreiteri* Lillo in Lilloa 1: 59. 1937 [nom. inval.].
 - * *Justicia pectoralis* Jacq., Enum. Syst. Pl.: 11. 1760.
 - * *Justicia poeppigiana* (Nees) Lindau in Bot. Jahrb. Syst. 19, Beibl. 48: 20. 1894.
 - * = *Leptostachya poeppigiana* Nees in C. Martius, Fl. Bras. 9: 150. 1847.
 - * *Justicia polygaloides* (S. Moore) Lindau in Bull. Herb. Boissier ser. 2, 3: 633. 1903.
 - * = *Dianthera polygaloides* S. Moore in Trans. Linn. Soc. London, Bot. 4: 433. 1895.
 - * *Justicia racemosa* Ruiz Lopez & Pavón, Fl. Peruv. 1: 9. 1798.
 - * *Justicia rizzinii* Wassh. in Bailey 19: 3. 1973.
 - * = *Justicia pauciflora* (Nees) Griseb. in Abh. Königl. Ges. Wiss. Göttingen 24: 262. 1879 [non M. Vahl in West, Bidr. Beskr. Ste Croix: 267. 1793].
 - * = *Sericographis pauciflora* Nees in C. Martius, Fl. Bras. 9: 110. 1847.
 - * *Justicia squarrosa* Griseb. in Abh. Königl. Ges. Wiss. Göttingen 19: 226. 1874.
 - * = *Beloperone squarrosa* (Griseb.) Lindau in Bot. Jahrb. Syst. 19, Beibl. 48: 21. 1894.

(Figure 1 continued)

- * *Justicia xylosteoides* Griseb. in Abh. Königl. Ges. Wiss. Göttingen 19: 225. 1874.
- * = *Beloperone scorpioides* Nees in A. DC., Prodr. 11: 422. 1847.
- * *indet.*

- Mendoncia* Vand., Fl. Lusit. Bras. Spec.: 43. 1788.
- * *Mendoncia hirsuta* Poeppig, Nov. Gen. Sp. Pl. 3: 10. 1840.

- Poikilacanthus* Lindau in Engl. & Prantl, Nat. Pflanzenfam. IV(3b): 342. 1895.
- * *Poikilacanthus tweedianus* (Nees) Lindau in Engl. & Prantl, Nat. Pflanzenfam. IV(3b): 342. 1895.
- = *Adhatoda tweediana* Nees in A. DC., Prodr. 11: 395. 1847.

- Ruellia* L., Sp. Pl.: 634. 1753.
- * *Ruellia bahiensis* (Nees) Morong in Ann. New York Acad. Sci. 7: 192. 1893.
- = *Dipteracanthus bahiensis* Nees in C. Martius, Fl. Bras. 9: 39. 1847.
- * *Ruellia brevifolia* (Pohl) Ezcurra in Darwiniana 29: 278. 1989.
- * = *Ruellia amoena* Nees in A. DC., Prodr. 11: 203. 1847 [nom. inval.].
- * = *Ruellia graecizans* Backer in Brittonia 3: 85. 1938.
- * = *Ruellia longifolia* (Pohl) Griseb. in Abh. Königl. Ges. Wiss. Göttingen 24: 260. 1879 [non Rich. in Actes Soc. Hist. Nat. Paris 1: 110. 1792].
- = *Stephanophysum brevifolium* Pohl, Pl. Bras. Icon. Descr. 2: 84. 1830-1831.
- * *Ruellia ciliatiflora* Hook. in Bot. Mag.: tab. 3718. 1839.
- * *Ruellia geminiflora* Kunth in Humb. & al., Nov. Gen. Sp. 2, ed. folio: 195; ed. 4^o: 240. 1818.
- * *Ruellia hygrophila* C. Martius in Flora (Regensburg) 24, Beibl. 2: 65. 1841.
- * *Ruellia hygrophila* var. *glabrescens* Hassler.
- * *Ruellia linearifolia* Leonard.
- * *Ruellia lorentziana* Griseb. in Abh. Königl. Ges. Wiss. Göttingen 24: 259. 1879.
- * *Ruellia macrosolen* Ezcurra in Syst. Bot. 14: 297. 1989.
- * *Ruellia microphylla* Cav., Icon. 6: 63. 1801.
- * *Ruellia nudiflora* (Engelm. & A. Gray) Urban, Symb. Antill. 7: 382. 1912.
- = *Dipteracanthus nudiflorus* Engelm. & A. Gray in Boston J. Nat. Hist. 5: 229. 1845.
- * *Ruellia sanguinea* Griseb. in Abh. Königl. Ges. Wiss. Göttingen 24: 260. 1879.
- * *Ruellia tweediana* Griseb. in Abh. Königl. Ges. Wiss. Göttingen 24: 259. 1879.
- * *Ruellia tweedii* (Nees) Morong & Britton in Ann. New York Acad. Sci. 7: 192. 1893.
- = *Blechum tweedii* Nees in A. DC., Prodr. 11: 466. 1847.
- * *indet.*

- Siphonoglossa* Oersted in Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 6: 159. 1855.
- * *Siphonoglossa gentianifolia* Lindau in Bull. Herb. Boissier ser. 2, 5: 370. 1905.
- * *Siphonoglossa sulcata* (Nees) Lindau in Bot. Jahrb. Syst. 19, Beibl. 48: 19. 1894.
- = *Jacobinia sulcata* Nees in A. DC., Prodr. 11: 333. 1847.

- Stenandrium* Nees in Lindley, Intr. Nat. Syst. Bot. ed. 2: 444. 1836.

(Figure 1 continued)

- * *Stenandrium breviflorum* Bridar. in Notas Mus. La Plata, Bot. 13: 82. 1948.
- * *Stenandrium dulce* (Cav.) Nees in A. DC., Prodr. 11: 282. 1847.
= *Ruellia dulcis* Cav., Icon. 6: 62. 1801.
- * *Stenandrium mandioccanum* Nees in C. Martius, Fl. Bras. 9: 76. 1847.
- * *Stenandrium trinerve* Nees in C. Martius, Fl. Bras. 9: 75. 1847.
- * *indet.*

Figure 2. — *Ruellia brevifolia* (Pohl) Ezcurrea

Eyerdam, W. J. & A. A. Beetle 22753

Ruellia longifolia (Pohl) Griseb. (Det. Johnston, I. M. IV-1940)
Ruellia brevifolia (Pohl) Ezcurrea (Det. Palese, R. 20-VI-1991)

Lorentz, P. G. & G. H. E. Hieronymus s.n.

Ruellia longifolia (Pohl) Griseb.
Ruellia brevifolia (Pohl) Ezcurrea (Det. Palese, R. 20-VI-1991)

Venturi, L. 3957

Ruellia longifolia (Pohl) Griseb.
Ruellia graecizans Backer (Det. Leonard, E. C. 14-III-1939)
Ruellia brevifolia (Pohl) Ezcurrea (Det. Palese, R. 20-VI-1991)

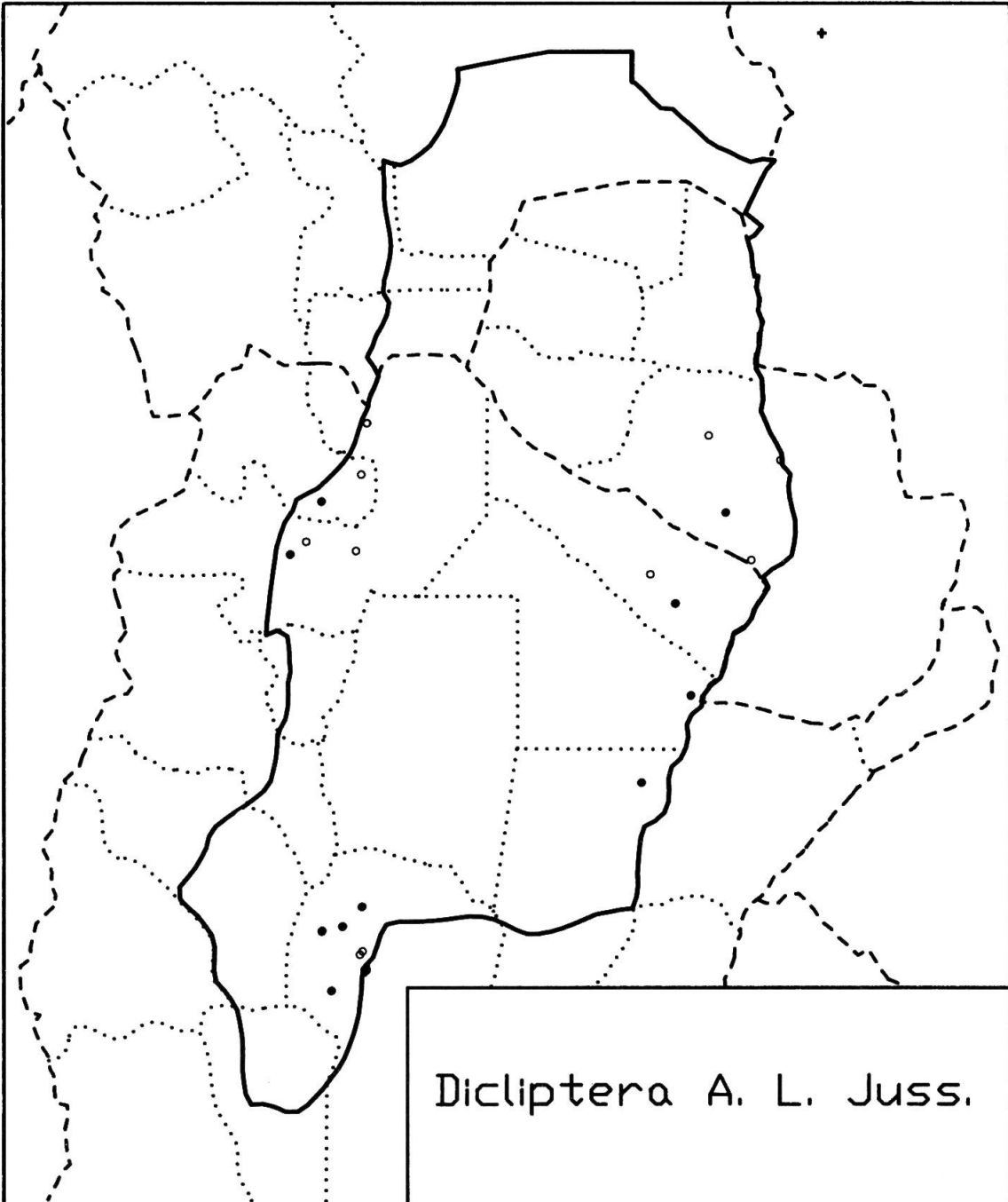
Charpin, A. & U. Eskuche AC20492

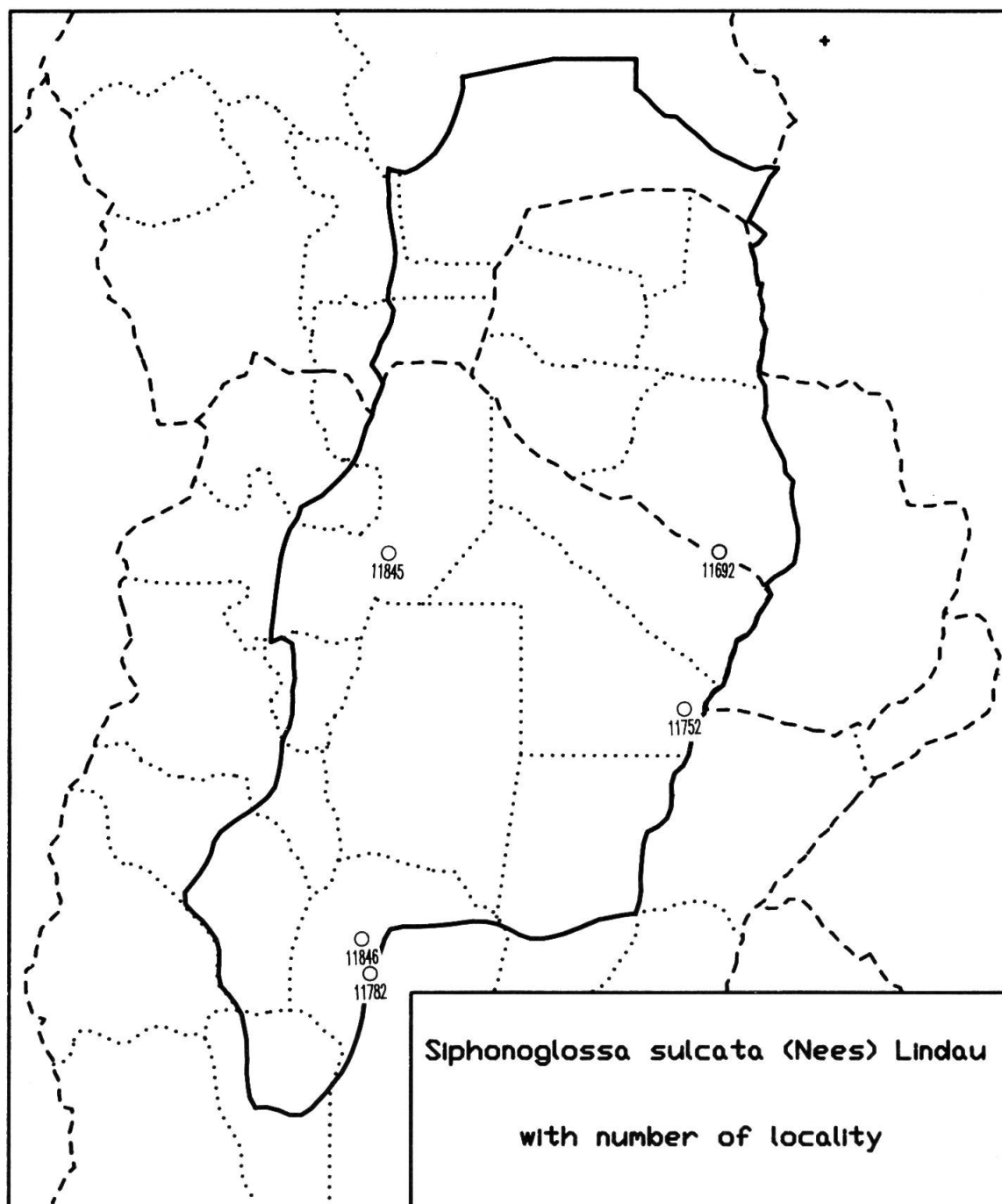
Ruellia graecizans Backer (Det. Wasshausen, D. 1988)
Ruellia brevifolia (Pohl) Ezcurrea (Det. Palese, R. 20-VI-1991)

Herzog, T. 1243

Ruellia amoena Nees (Det. Lindau, G.)
Ruellia brevifolia (Pohl) Ezcurrea (Det. Palese, R. 20-VI-1991)

Figure 3. — *Dicliptera* A. L. Juss.



Figure 4. — *Siphonoglossa sulcata* (Nees) Lindau

- | | |
|-------|--|
| 11692 | Pilcomayo, río (curso inferior), Presidente Hayes (PAR), 24°50'S/058°30'W (A). |
| 11752 | Margarita Belén, Chaco (ARG), 27°16'S/058°58'W (P). |
| 11782 | Cerro Ochoa, Córdoba (ARG), 31°24'S/064°24'W (P). |
| 11845 | Anta, departamento, Salta (ARG), 24°55'S/064°00'W (A). |
| 11846 | Capilla del Monte, Córdoba (ARG), 30°51'S/064°31'W (P). |

Figure 5. — *Ruellia tweediana* Griseb.**Chaco (ARG):**

"Colonia Benítez", 29-X-1964, *Schulz, A. G.* 14105 (G);

Formosa (ARG):

"Ca 20 km NW Cdte Fontana, Ruta 81", 11-XI-1986, *Charpin, A. & U. Eskuche* AC20344 (G);

"Ruta 11 km. 115", 1-VII-1947, *Morel, I.* 3297 (G);

"Ruta 86 al Km. 58", 16-II-1948, *Morel, I.* 4726 (G);

"Ruta 86 al Km. 50", 20-III-1948, *Morel, I.* 5119 (G);

"Pilagá", 3-X-1945, *Pierotti, S. A.* 4270 (G);

"Bartolomé de las Casas. A 1 km. N del puente rio Pilagá", 8-V-1969, *Schulz, A. G.* 16983 (G);

Salta (ARG):

"El Quebrachal", 14-II-1948, *Luna, F. E.* 705 (G);

"Cerro San Bernardo", 12-III-1948, *Sotelo, J. B.* 837 (G);

Boquerón (PAR):

"Tte. 1° Alfredo Stroëssner asiento 7a. División Infantería (R. I. 10 Sauce)", 9-X-1987, *Spichiger, R., L. Ramella, F. Mereles, N. Soria & L. Spinzi* RS2071 (G);

Chaco (PAR):

"Misión Nueva Tribu (Cerro León — Chaco). En la orilla de la 1a laguna", 1-X-1979, *Eskuche, U. & K. Okutomi* 4515 (G);

"Cap. Pablo Lagerenza. Cauce del Río Timane", 24-X-1987, *Spichiger, R., L. Ramella, F. Mereles, N. Soria, L. Spinzi & P. Arenas* RS2512 (G);

Nueva Asunción (PAR):

"Tte. 1° A. Picco Tte. 1o. Americo Picco", 21-X-1987, *Spichiger, R., L. Ramella, F. Mereles, N. Soria, L. Spinzi & P. Arenas* RS2277 (G);

Presidente Hayes (PAR):

"Estancia Tinfunque. Retiro Pozo Arias", 4-X-1987, *Spichiger, R., L. Ramella, F. Mereles, N. Soria & L. Spinzi* RS2068 (G);

"Estancia Tinfunké; a 5 km al oeste de Tinfunké (camino al Retiro 3 Marías)", 23-IX-1987, *Spichiger, R., L. Ramella, F. Mereles, N. Soria & L. Spinzi* RS2140 (G).

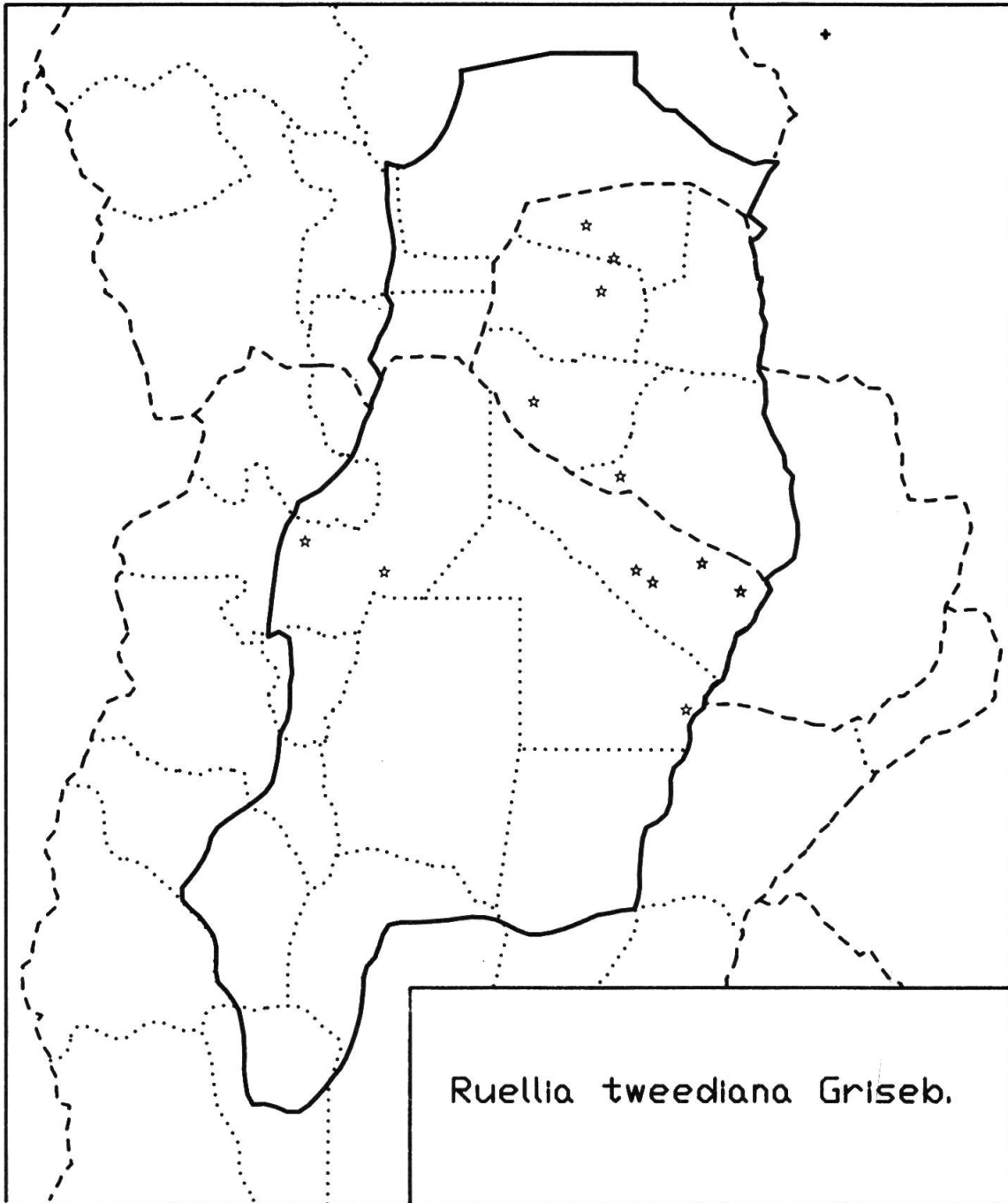
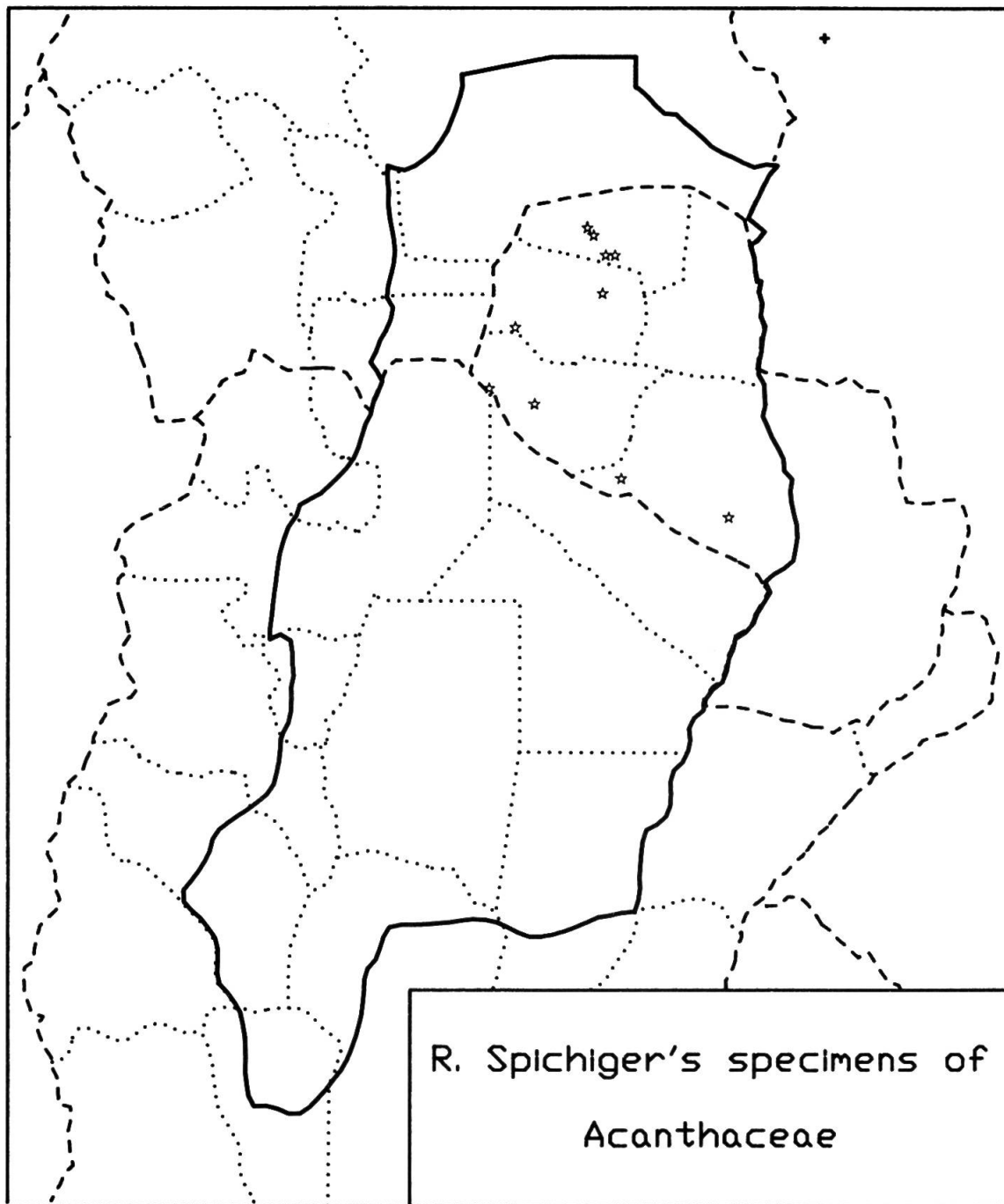


Figure 6. — R. Spichiger's specimens of *Acanthaceae*

23-IX-1985	Ruta Transchaco, km 160, Presidente Hayes (PAR), 1540 Spichiger, R. & P.-A. Loizeau.
23-IX-1987	Estancia Tinfunque, Presidente Hayes (PAR), RS2140 Spichiger, R., L. Ramella, F. Mereles, N. Soria & L. Spinzi.
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Conclusion

The preliminary Chaco checklist, established on the basis of the Geneva herbaria collections, has now entered its active phase. The processing of the *Acanthaceae* has allowed the realization of a methodology and a strategy for access to the database.

The checklist is an open system which can be added to by means of entering more recent data as well as by using the latest taxonomic revision taking into consideration determinations provided by group experts.

At this point of the project, two kinds of publications are being considered:

- informations on development of the project (families processed, collections taken into consideration, collaboration, statistical data, etc.), at regular intervals
- by family, i.e. a fascicle containing taxonomic, chorologic and bibliographical data, published as lists and maps and then if required updated.

The realization of a Chaco information system as presented above can only be carried out on condition of widely extended network collaboration. Access to Chaco collections worldwide, interchange with local floristic projects as well as taxonomic expertise are key factors for carrying out this project successfully.

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