

〈研究資料〉

Records of plant exploration for South America conducted by the Laboratory of Ornamental Plant Science. Part II. From 1995 to 2001.

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ABSTRACT

In order to serve succeeding researchers, official records of exploration to South America from 1995 to 2001 conducted by the Laboratory of Ornamental Plant Science were provided. The exclusive purpose of the exploration was to observe native habitats of a solanaceous genus *Petunia sensu* Jussieu. During the exploration for the seven seasons, 858 different herbarium specimens (210 specimens from Argentina, 595 from Brazil, 1 from Mexico, 37 from Paraguay and 15 from Uruguay) were collected, and the total distance covered was 69,193km (27,123km in Argentina, 31,308km in Brazil, 2,349km in Mexico, 4,748km in Paraguay, 840km in Peru, and 2,825km in Uruguay). The accumulation from 1988 to 2001 is as follows: 2,073 specimens (239 from Argentina, 1,489 from Brazil, 1 from Mexico, 38 from Paraguay, and 307 Uruguay) and 132,777km (30,603km in Argentina, in 68,396km Brazil, 2,349km in Mexico, 4,748km in Paraguay, 840km in Peru, and 24,355km in Uruguay).

INTRODUCTION

This is the official record of exploration to South America conducted by the Laboratory of Ornamental Plant Science for seven seasons from 1995 to 2001. This is the continuation of a previous paper [2], which provided records from 1988 to 1994. The exclusive purpose of the exploration was to observe natural habitats of a solanaceous genus *Petunia* Jussieu endemic to temperate and subtropical South America, with an exception, *Petunia parviflora* Juss. which had been known to occur in North America as well [8]. Therefore, the most concerned regions in this record are northern Argentina, southern Brazil, Paraguay and Uruguay. The exploration to Bolivia has not been conducted as yet.

The genus *Calibrachoa*, which was formerly included in the genus *Petunia*, was resurrected in 1990 [10] and *Petunia parviflora* and its alliance have been transferred into it, so that today's *Petunia* is often referred to as *Petunia sensu* Wijsman in order to distinguish it from

the original definition, *Petunia sensu* Jussieu. In this sense, the exploration is for both *Petunia sensu* Wijsman and *Calibrachoa*.

Ultimate object of the exploration is to illustrate fine distribution map of allopatric species of *Petunia sensu* Jussieu geographically isolated from one another. The purpose of the present report is to present exact routes examined by the author for precise inspection or improvement of the distribution map by succeeding researchers. The record provides exact routes examined. In other words, it clarifies the route that is not examined as yet. When herbarium code, as mentioned below, is added to the daily entries, the author ensures "presence" of *Petunia sensu* Jussieu beside the given route on the given day.

MATERIALS AND METHODS

Research Collaborators

Argentinean research collaborators are Prof. Juan H. Hunziker (Instituto de Botánica Darwinion, San Isidro, Provincia de Buenos Aires) and Dr. Enrique Y. Suárez

(Instituto de Recursos Biológicos, INTA, Castelar, Provincia de Buenos Aires). Brazilian collaborator is Dr. Goro Hashimoto (Centro de Pesquisas de História Natural, Itaquera, São Paulo). Mexican collaborator is Dr. Ken Oyama (Centro de Ecología, Universidad Nacional Autónoma de México, Mexico City). Paraguayan collaborator is Dr. Isabel L. Basualdo (Sección Botánica, Facultad de Ciencias Químicas, Universidad Nacional de Asunción, San Lorenzo). Peruvian collaborator is Dr. Arnaldo L. Miranda (Herbario Truxillense, Universidad Nacional de Trujillo, Trujillo). Uruguayan collaborator is Prof. Eduardo Marchesi (Facultad de Agronomía, Universidad de la República, Montevideo).

Contents

A record for each day is arranged in the following order;

- 1) Names of locality passed in the given day, often with route name enclosed in parenthesis. The abbreviation in the parenthesis just after locality name means Province (Argentina), State (Brazil) or Department (Paraguay and Uruguay). The name of person in parenthesis is the local supporter who kindly drove for us.
- 2) Codes followed by the first slash are locality codes defined on the given day. A locality thus defined is a place around which the author and his crews walked for at least ten minutes to examine the occurrence of *Petunia sensu* Jussieu. All locality codes begin with 'P' and followed with single capital representing the country (A for Argentina, B for Brazil, M for México, P for Paraguay, U for Uruguay).
- 3) Codes followed by the second slash are codes of herbarium specimens (specimen code, herbarium code) collected on the given day. All specimen codes begin with single capital representing the country as above.
- 4) Distance covered on the given day in kilometer. Total distance covered is the accumulation of what the author drove exclusively for examining occurrence of *Petunia sensu* Jussieu along the route, so that the distance covering for visiting herbaria or inspecting local flower productions is not counted.
- 5) Visited herbarium was also shown using abbreviations as mentioned below.

Herbarium specimens

All herbarium specimens thus collected were kept temporarily by the author except those referred in published papers [1, 3, 4, 5, 6, 7]. When additional specimens are referred in subsequent papers, they will be deposited in appropriate herbaria. All specimens are pressed and dried, and explanation of collected place and GPS data are provided in the respective sheets.

Symbols

>>>>: transport by aircraft. →: transport by vehicle.

Abbreviations

- 1) Argentinean Provinces; BA (Buenos Aires), CA (Córdoba), CB (Chubut), CC (Chaco), CN (Catarina), CR (Corrientes), ER (Entre Ríos), FA (Formosa), JJ (Jujuy), LP (La Pampa), LR (La Rioja), MI (Misiones), MZ (Mendoza), NQ (Neuquén), RN (Río Negro), SA (Salta), SC (Santa Cruz), SE (Santiago del Estero), SF (Santa Fe), SL (San Luis), SJ (San Juan), TM (Tucumán).
- 2) Brazilian States; PR (Paraná), RS (Rio Grande do Sul), SC (Santa Catarina), SP (São Paulo).
- 3) Paraguayan Departments; AP (Alto Paraná), BQ (Boqueron), CA (Cordillera), CG (Caaguazú), CL (Central), CZ (Caazapa), GA (Guairá), HS (PTE. Hayes), IA (Itapua), LM (La Misiones), PI (Paraguari).
- 4) Uruguayan Departments; AS (Artigas), CA (Colonia), CL (Cerro Largo), CS (Canelones), DO (Durazno), FA (Florida), FS (Flores), LA (Lavalleja), MO (Maldonado), RA (Rocha), RN (Río Negro), PU (Paysandú), RA (Rivera), SJ (San José), SNO (Soriano), STO (Salto), TO (Tacuarembó), TT (Treinta y Tres).
- 5) Drivers; Kihara (Mr. Emilio Kihara, Lima, Peru), Koshizawa (Mr. Tomio Koshizawa, São Paulo, Brazil), Nagase (Mr. Sebastião Toru Nagase, São Paulo, Brazil), Okubo (Mr. Roberto H. Okubo of São Paulo, Brazil), Uto (Mr. Noriaki Uto, Asunción, Paraguay).
- 6) Local supporters; Aoki (Mr. Tsuguyoshi Aoki, Marcos Paz, Provincia de Buenos Aires, Argentina), Hiranaka (Mr. Nobuyuki Hiranaka, Atibaia, São Paulo, Brazil), Nishimura (Mrs. Keiko Nishimura, Villa del Parque, Capital Federal, Argentina), Saito

(Mr. Takeshi Saito, Ibiúna, São Paulo, Brazil), Takanashi (Mr. Kazuo Takanashi, São José dos Campos, São Paulo, Brazil), Udagawa (Mr. Masao Udagawa, Montevideo, Uruguay).

- 7) Herbaria after Holmgren et al. [9]; BAB (Herbario, Instituto de Recursos Biológicos, INTA, Castellar, Provincia de Buenos Aires, Argentina), FCQ (Herbario, Sección Botánica, Facultad de Ciencias Químicas, Universidad Nacional de Asunción, San Lorenzo, Paraguay), HBR (Herbário Barbosa Rodrigues, Itajai, Santa Catarina, Brazil), HUT (Herbario Truxillense, Universidad Nacional de Trujillo, Trujillo, Peru), ICN (Herbario, Departamento de Botánica, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil), MEXU (Herbario Nacional, Departamento de Botánica, Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, Mexico), MBM (Herbário, Museu Botânico Municipal, Curitiba, PR, Brazil), MVFA (Herbario, Laboratorio de Botánica, Facultad de Agronomía, Universidad de la República, Montevideo, Uruguay), PY (Herbario, Centro de Estudios y Colecciones Biológicas para la Conservación, San Lorenzo, Paraguay), SI (Herbario, Instituto de Botánica Darwinion, San Isidro, Provincia de Buenos Aires, Argentina), USM (Herbario, Division de Botánica, Museo de Historia Natural, Facultad de Ciencias, Universidad Nacional Mayor de San Marcos, Lima, Peru) and GHSP (Herbário Goro Hashimoto, Centro de Pesquisas de História Natural, Itaquera, São Paulo, SP, Brazil, not included in Holmgren et al. [9] as yet).

RESULTS

1995-1 (Eighth Exploration; total distance covered, 2,027km)

Sept 09: Narita >>>> San Francisco (U.S.A.) >>>>

MEXICO (Ando & Ken Oyama)

Mexico City.

Sept 10: Mexico City.

Sept 11: Mexico City (visited MEXU).

Sept 12: Mexico City >>>> Monterrey→Santa Catarina
→Ojo Cariente→Saltillo/PM1-6/none/153km.

Sept 13: Saltillo→Ojo Cariente→Saltillo→Muralla→
Monclova/PM7-11/none/222km.

Sept 14: Monclova→Cuatrociénegas/PM12-16/none.

Sept 15: Cuatrociénegas→Monclova→Muralla→Monclova→Muralla→Saltillo/PM17-18/M1.

Sept 16: Saltillo→San Roberto→Linares/PM19-26/
none/226km.

Sept 17: Linares→Montemorelos→Monterrey/PM27-30/none >>>> Mexico City.

Sept 18: Mexico City→Toluca/PM31-34/none/122km.

Sept 19: Toluca→Nevado de Toluca→Valle de Bravo→
Toluca/PM35-40/none/251km.

Sept 20: Toluca→Mexico City/PM41-42/none.

Sept 21: Mexico City >>>> Los Angeles (U.S.A.) >>>>

Sept 22: Narita.

1995-2 (Ninth Exploration with Tatsuya Tsukamoto and Takeshi Kanaya as the crews; total distance covered, 9,926km; Fig. 1)

Nov 01: Narita >>>> Los Angeles (U.S.A.) >>>> São Paulo (Brazil) >>>>

URUGUAY (Ando & Tsukamoto; 1,008km)

Nov 02: Montevideo (c/o Udagawa).

Nov 03: Montevideo (visited MVFA)→(Rt. 5)→Canelones (CS)→Florida (FA)→Durazno (DO)→Paso de los Toros (TO)→Tacuarembó/PU497/U293/375km.

Nov 04: Tacuarembó→(Rt. 5)→Rivera (RA)→(Rt. 27)→Ataques→(Rt. 28)→Minas de Corrales→(Rt. 29/5)→Tacuarembó (TO)→Paso de los Toros→Durazno (DO)→Florida (FA)→Montevideo/PU498-500/U294-295/633km.

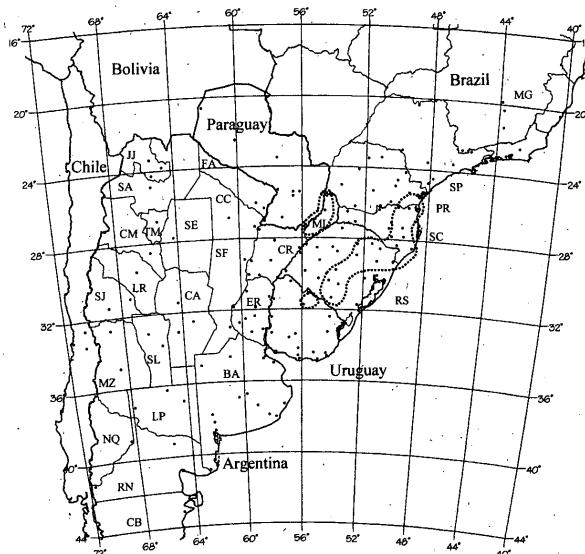


Fig. 1 Areas explored in 1995 (enclosures of broken line). Major towns are indicated by dots.

Nov 05: Montevideo >>>>

ARGENTINA (Ando & Tsukamoto; 1, 560km)

Buenos Aires→Villa del Parque (c/o Nishimura).

Nov 06: Villa del Parque (visited SI).

Nov 07: Villa del Parque (visited BAB).

Nov 08: Villa del Parque→Buenos Aires >>>> Posadas (MI)→Candelaria→Santa Ana→Bonpland→L.N. Alem→Oberá→Campo Viera→Yacutinga→Gobernador Roca→San Ignacio→Santa Ana→Candelaria→Posadas/PA138-143/A110-112/311km.

Nov 09: Posadas→Candelaria→Santa Ana→Mártires→San Martín→Oberá→Campo Viera→Campo Grande→Aristóbulo del Valle→Dos de Mayo→(N14)→San Pedro→(P20/17)→Eldorado→Montecarlo→Puerto Rico→San Igunacio→Santa Ana→Candelaria→Posadas/PA144-157/A114-118/582km.

Nov 10: Posadas→Candelaria→Santa Ana→San Igunacio→Puerto Rico→Montecarlo→Eldorado→Puerto Esperanza→Cataratas del Iguazú→(the same route)→Posadas/PA158-167/A119-120/667km.

Nov 11: Posadas >>>> Buenos Aires >>>>

BRAZIL (Ando, Tsukamoto & Kanaya; 7, 358km)

São Paulo.

Nov 12: São Paulo (visited GHSP)→São José dos Campos (c/o Takanashi).

Nov 13: São José dos Campos→Ibiúna (c/o Saito).

Nov 14: Ibiúna→São Paulo.

Nov 15: (Koshizawa) São Paulo→Registro→Jacupiranga→Curitiba (PR, visited MBM)/none/none/436 km.

Nov 16: Curitiba→(BR376/BR101)→Joinville (SC)→Itajai (visited HBR)→(SC470)→Blumenau→Rio do Sul→Trombudo Central→Agrolândia/PB1124-1132/B904/415km.

Nov 17: Agrolândia→(obscure)→Petrolândia→(SC427)→Torre→entrance of Canoas→(BR282)→Bocaina do Sul→Índios (U-turn)→Bocaina do Sul→Bom Retiro/PB1133-1138/B905-910/262km.

Nov 18: Bom Retiro→(BR282/SC430)→Urubici→upper stream of Rio Urubici (U-turn)→Urubici→(trail to E)→Morro da Igreja (U-turn)→Serra da Corbo Branco→(dangerous route)→Aiurê→Grão Pará→(SC439)→Braço do Norte→Gravatal→Tubarão/PB 1139-1152/B911-917/206km.

Nov 19: Tubarão→(BR101/SC442)→Jaguaruna→Santa Marta→(balsa)→Laguna→Tubarão→(BR101)→Es-

planada→(SC444)→Rincão (U-turn)→(SC444/BR 101)→Araranguá→(SC449)→Arroio do Silva (U-turn)→Araranguá→(BR 101)→Sombrio→Torres (RS)/PB1153-1157/B918-922/312km.

Nov 20: Torres→Capão da Canoa→Osório→(BR290)→Porto Alegre (visited ICN)→(BR116/BR290)→Butiá /PB1158/none/312km.

Nov 21: Butiá→(BR290/BR116)→Porto Alegre (visited ICN, U-turn)→Butiá→Pântano Grande→Caçapava do Sul→(BR153, south entrance)→Guarita (U-turn)→(south entrance, BR153)→Caçapava do Sul/PB 1159-1164/B923-927/466km.

Nov 22: Caçapava do Sul→(BR153, north entrance)→Guarita (U-turn)→(north entrance, BR153)→Caçapava do Sul→(BR153, north entrance)→Guarita (Fazenda João Dutra, U-turn)→(BR392)→Caçapava do Sul/PB1165-1167/B928/186km.

Nov 23: Caçapava do Sul→(BR153, north entrance)→Guarita→Minas do Camaquã→(BR153, south entrance)→(RS357)→Vila São José→Segredo→Caçapava do Sul/PB1168-1170/B929-931/146km.

Nov 24: Caçapava do Sul→(RS357)→Segredo→Pedra de Segredo (U-turn)→Segredo→(RS357)→Vila São José→(BR153)→Bajé (Bagé)→Tábua→(trail to E)→Colônia Nova→(obscure)→Bajé→(BR293)→Dom Pedrito/PB1171-1185/B932-940/370km.

Nov 25: Dom Pedrito→(RS630)→Vacacai→São Gabriel→Tiaraju→Guabiju→(obscure)→Colônia Pinheiro→(BR392)→Santa Maria/PB1186-1200/B941-947/237 km.

Nov 26: Santa Maria→(RS509)→Camobi→Candelária→(RS400)→Sobradinho→Segredo→Lagoão→Barros Cassal→Soledade/PB1201-1214/B948-957/294km.

Nov 27: Soledade→(RS332)→Arvorezinha→Ilópolis→Encantado→Between Guaporé and Muçum (U-turn)→Encantado→Lajeado/PB 1215-1227/B 958-972/209km.

Nov 28: Lajeado→(BR386)→Estrela→Canoas→Porto Alegre (Nagase)→(BR116)→Canoas→São Leopoldo→(RS 122)→Portão→São Sebastião do Caí→Garibaldi→Bento Gonçalves/PB1228/none/260km.

Nov 29: Bento Gonçalves→(trail to E)→Barracão→Nova Roma do Sul→Antônio Prado→Ipê→Porteirinha→(RS122/BR116)→Vacaria→(BR285/trail to NW)→half way to Esmeralda (U-turn)→(trail/BR

- 285) → Muitos Capões → Lagoa Vermelha/PB1229-1246/B973-984/269km.
- Nov 30: Lagoa Vermelha → (BR285/RS470) → Tupinambá → André da Rocha → Nova Prata → (trail to W) → Vista Alegre → Guaporé → (SC129) → Dois Lajeados → Santa Barbara → Bento Gonçalves → Garibaldi → São Roque Figueira de Mello (U-turn) → Garibaldi → Bento Gonçalves/PB1247-1257/B985-990/231km.
- Dec 01: Bento Gonçalves → (RS470) → Veranópolis → Nova Prata → Nova Araçá → (trail to N) → Vila São Pedro de Guabijú → (trail to SE) → Nova Prata → (RS470/RS448) → Antônio Prado → (RS122) → Flores da Cunha → Caxias do Sul → Farroupilha → Bento Gonçalves/PB1258-1273/B991-999/339km.
- Dec 02: Bento Gonçalves → Farroupilha → Caxias do Sul → (BR116) → Nova Petrópolis → (RS235) → Gramado → Canela → São Francisco de Paula → (RS110) → Várzea do Cedro → (RS230) → Lajeado Grande → Vila Seca → Ana Reck → (BR116) → São Marcos → Vacaria/PB1274-1283/B1000-1010/382km.
- Dec 03: Vacaria → (BR285) → Bom Jesus → Capão Alto → (trail to NE) → Santo Inácio → São Francisco Xavier (SC) → São Joaquim/PB1284-1296/B1011-1029/167 km.
- Dec 04: São Joaquim → (SC56) → Cruzeiro → Bom Jardim da Serra → (Serra Geral) (U-turn) → Bom Jardim da Serra → (trail to N, U-turn) → Bom Jardim da Serra → Cruzeiro → São Joaquim/PB1297-1299/B1031-1035/138km.
- Dec 05: São Joaquim → Cruzeiro → (SC57) → Pericó → Urubici → (trail to W) → Rio Rufino → Canoas → (old BR282) → Paraíso da Serra (U-turn) → Bom Retiro/PB1300-1311/B1036-1050/178km.
- Dec 06: Bom Retiro → (SC430) → Urubici → (trail to E) → São Pedro → Campo dos Padres (U-turn) → Serra do Corvo Branco (U-turn) → São Pedro → Urubici → Cascata do Avencal (U-turn) → Urubici → (SC430) → Bom Retiro/PB1312-1315/B1051-1053/176km.
- Dec 07: Bom Retiro → Urubici → Campo dos Padres → Urubici/PB1316-1318/B1054/100km.
- Dec 08: Urubici → Rio Rufino → Canoas → (trail to W) → Bocaina do Sul → (BR282/trail) → Paraíso da Serra (U-turn) → Campo Novo → Bom Retiro/PB1319-1331/B1055-1066/189km.
- Dec 09: Bom Retiro → (BR282) → Alfredo Wagner → (trail to N) → Leoberto Leal → Imbuia → Ituporanga → (SC302) → Rio do Sul → (SC302) → Rio do Oeste → Taió → (SC423) → Passo Manso → (trail to W) → Santa Cecília → (BR116) → Monte Castelo → Papanduva/PB1332-1344/B1067-1071/336km.
- Dec 10: Papanduva → (BR116) → Mafra → Rio Negrinho → São Bento do Sul → (trail to N) → Agudos do Sul (PR) → Tijucas do Sul → Campo Largo da Roseira → Miringuava → Curitiba/PB1345-1353/B1072-1079/251 km.
- Dec 11: Curitiba → Jacupiranga (SP) → Registro → São Paulo (c/o Nagase)/none/none/501km.
- Dec 12: São Paulo.
- Dec 13: São Paulo (visited GHSP).
- Dec 14: São Paulo >>>> Los Angeles (U.S.A.) >>>>
- Dec 15: Narita.
- 1996-1 (Tenth exploration; total distance covered, 1,162km)
- Aug 07: Narita >>>> Los Angeles (U.S.A.) >>>>
- PERU (Ando, total distance covered, 840km)
- Lima.
- Aug 08: Lima (visited USM).
- Aug 09: (Kihara) Lima → Huachipa → Ruínas Cajamarquilla → Huachipa → Chosica → Santa Eulalia → Callahuanca → Santa Eulalia → Chosica → Huchipa → Lima/R1/none.
- Aug 10: Lima >>>> Trujillo → Otuzco/R2/none/77km.
- Aug 11: Otuzco → Agallpampa → Hacienda Motil → Quiruvilca → Huamachuco/R3-5/none.
- Aug 12: Huamachuco → Hacienda Yamasara → El Pallar → Fundo Convento → El Pallar → Hacienda Yanasara → Huamachuco/R6/none.
- Aug 13: Huamachuco → Hacienda Yamasara → El Pallar → Fundo Convento → Quebrada Urupayacu → Fundo Convento → El Pallar → Hacienda Yanasara → Huamachuco/R7-8/none.
- Aug 14: Huamachuco → Quiruvilca → Hacienda Motil → Agallpampa → Otuzco → Trujillo/R9-11/none.
- Aug 15: Trujillo (visited HUT) >>>> Lima → Ventanilla → Ancon → Chancay → Loma de Lachay → Chancay → Ancon → Ventanilla → Lima/R12/none.
- Aug 16: Lima >>>>
- MEXICO (Ando & Ken Oyama; total distance covered, 322km)
- Mexico City.
- Aug 17: Mexico City (visited MEXU).

Aug 18: Mexico City→Puebla→Mexico City/none/none.

Aug 19: Mexico City >>>> San Francisco (U.S.A.) >>>>

Aug 20: Narita.

1996-2 (Eleventh exploration with Koichi Yasumoto and Jun Tsukahara; total distance covered, 8,711km, Fig. 2)

Nov 06: Narita >>>> Los Angeles (U.S.A.) >>>>

BRAZIL (Ando, Yasumoto & Tsukahara; 8,711km)

Nov 07: São Paulo (visited GHSP).

Nov 08: São Paulo.

Nov 09: (Okubo) São Paulo→(BR116)→Registro→Jacupiranga→Curitiba (PR, visited MBM)/none/none/446km.

Nov 10: Curitiba→Araucária→(BR476)→Contenda→Lapa→São Mateus do Sul→União da Vitoria→(trail to NW)→Cruz Machado→Santana (U-turn)→Cruz Machado→União da Vitoria→Port União (SC)/PB 1354-1369/B1080-1086/388km.

Nov 11: Porto União→(BR153)→General Carneiro (PR)→(BR280)→Palmas→(trail to NW)→Mangueirinha→Passa Quatro→Chopinzinho→São João→Dois Vizinhos→Salto do Lontra→Realeza→Capitão Leônidas Marques/PB1370-1386/B1087-1097/440km.

Nov 12: Capitão Leônidas Marques→Santa Teresa do Oeste→(BR277)→Medianeira→Foz do Iguacu (U-turn)→Medianeira→Santa Teresa do Oeste→Capitão Leônidas Marques/PB1387-1388/none/435km.

Nov 13: Capitão Leônidas Marques→Realeza→Salto do Lontra→Dois Vizinhos→São Jorge d'Oeste→(trail to NW)→Quedas do Iguaçu→Laranjeiras do Sul→(BR 158)→Rio Bonito→São Francisco→Chopinzinho→Passa Quarto→Coronel Vivida→Pato Branco/PB1389-1397/B1098-1103/394km.

Nov 14: Pato Branco→(BR280)→Clevelândia→Palmas→General Carneiro→Porto União (SC)→(BR280)→Poço Preto→Canoinhas→Major Vieira→Monte Castero→(BR116)→Santa Cecília→São Cristóvão do Sul→(BR470)→Trombudo Central→Agrolândia/PB 1398-1402/B1104-1107/576km.

Nov 15: Agrolândia→Atalanta→Petrolândia→Ituporanga→(SC302)→Arнопolis (trail to S)→Barro Branco→Bom Retiro/PB1403-1409/B1108-1110/234 km.

Nov 16: Bom Retiro→Urubici→Rio Rufino→Urupema→Santa Isabel→São Joaquim/PB1410-1416/B1111-1120/164km.

Nov 17: São Joaquim→Cruzeiro→Bom Jardim da Serra→(Serra Geral) (U-turn)→Bom Jardim da Serra→Cruzeiro→Urubici/PB1417-1425/B1121-1130/184km.

Nov 18: Urubici→Águas Brancas→(trail to W)→São Francisco→Rio Rufino→Urupema→Painel→Lages (Lages)→(BR282)→Índios→Canoas→Urubici/PB 1426-1437/B1133-1148/274km.

Nov 19: Urubici→Campos dos Padres→Urubici/PB 1438-1442/B1149-1150/70km.

Nov 20: Urubici→Pericó→Santa Isabel→Painel→Lages→(BR116)→Vacaria (PR)→(BR285)→Lagoa Vermelha/PB1443-1447/B1151-1158/348km.

Nov 21: Lagoa Vermelha→Campo do Meio→(trail to S)→Casca→(RS324)→Vira Maria→(trail to S)→Camargo→Moranqueira→Soledade→(BR 386)→Lajeado→Venâncio Aires→Candelária/PB1448-1463/B 1159-1173/386km.

Nov 22: Candelária→Santa Maria→(Nagase)→(BR392)→São Sepé→Caçapava do Sul→(RS357)→Segredo→São José→(trail to Serra de Santa Bárbara)→Segredo→Caçapava do Sul/PB1464-1470/B1174-1177/309km.

Nov 23: Caçapava do Sul→(BR153/south entrance)→Minas do Camaquã→Guarita→(north entrance/BR 153)→Caçapava do Sul/PB1471-1474/B1178-1182/134km.

Nov 24: Caçapava do Sul→(BR153/south entrance)→

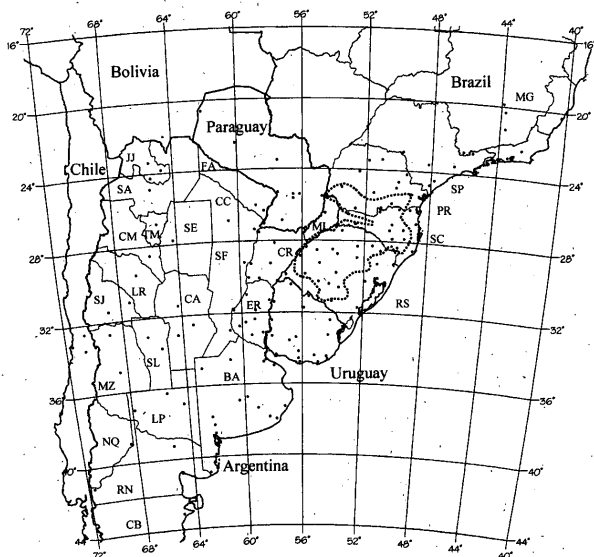


Fig. 2 Areas explored in 1996 (enclosures of broken line). Major towns are indicated by dots.

- Grossa→Reserva→(PR239)→Três Bicos→Cândido de Abreu→Manoel Ribas→Pitanga/PB1585-1594/B1253-1254/401km.
- Nov 04: Pitanga→(trail to SSW)→Santa Maria→Palmital→Santa Maria do Oeste→Palmital→Marquinho→Laranjeiras do Sul→(BR277)→Nova Laranjeiras→Guaraniaçu→Catanduvas→Três Barras do Paraná (U-turn)→Catanduvas→Cascavel→Santa Teresa do Oeste/PB1595-1607/B1255-1261/413km.
- Nov 05: Santa Teresa do Oeste→Foz do Iguaçu (U-turn)→Santa Teresa do Oeste→(PR182)→Capitão Leônidas Marques/none/none/363km.
- Nov 06: Capitão Leônidas Marques→Realeza→(trail to W)→Planalto→(trail to N)→Capanema→Porto Moises Lupino (U-turn)→Capanema→Planalto→(trail to S)→Santo Antônio do Sudoeste→Barracão→(BR163)→São Miguel do Oeste (SC)→(BR282)→Malavilha→(BR158)→Iraí (RS)→Fredecico Westphalen→Seberi/PB1608-1616/none/411km.
- Nov 07: Seberi→(BR386)→Jaboticaba→(near Sarandi, RS569 to W)→Barra Funda→Barreiro→Palmeira do Missões→(RS158 to S)→Panambi→Cruz Alta→(BR158)→Júlio de Castilhos/PB1617-1636/B1262-1287/288km.
- Nov 08: Júlio de Castilhos→(trail to NW)→Tupanciretã→(BR377 to W)→Santiago/PB1637-1657/B1288-1303/217km.
- Nov 09: Santiago→(RS546 to SW)→São Francisco de Assis→(RS241 to W)→Manoel Viana→(RS176 to N)→Sobradinho→Encruzilhada→(BR287)→Santiago/PB1658-1669/B1304-1316/255km.
- Nov 10: Santiago→(BR453)→Jaguari→São Vicente do Sul→Cacequi→Rosário do Sul→(BR290)→São Gabriel→Caçapava do Sul→Pântano Grande→Butiá/PB1670-1673/B1317-1320/506km.
- Nov 11: Butiá→(BR290)→Arroio dos Ratos→Guaíba→(trail to S)→Barra do Ribeiro→Tapes→Arambaré→Camaquã→(BR116)→São Lourenço do Sul/PB1674-1679/B1321-1324/332km.
- Nov 12: São Lourenço do Sul→(BR116)→Pelotas (U-turn)→São Lourenço do Sul/none/none/187km.
- Nov 13: (Nagase) São Lourenço do Sul→(BR116)→Pelotas→Quinta (BR471)→Santa Vitória do Palmar→Xuí (Chuí)→

URUGUAY

Barra del Chuy (U-turn)/PU501/none /→

BRAZIL (continuation)

Xuí/PB1680-1687/B1325-1328/396km.

- Nov 14: Xuí→Santa Vitória do Palmar→Porto Lagoa Mirim (U-turn)→Santa Vitória do Palmar→(BR471)→Quinta→Rio Grande→(balsa)→São José do Norte→Ponta dos Pescadores (U-turn)→São José do Norte→/PB1688-1691/B1329-1331/328km.
- Nov 15: São José do Norte→(RS101)→Estreito→Boju-rú (U-turn)→Estreito→São José do Norte→(balsa)→Rio Grande→Quinta→Pelotas/PB1692-1697/B1332-1338/192km.
- Nov 16: Pelotas→(BR116)→São Lourenço do Sul→Camaquã→Guaíba→Port Alegre→Vila Itapuã (U-turn)→Viamão→(RS40)→Cativari→(RS101)→Palmares do Sul→Mostradas (U-turn)/PB1698-1702/B1339-1343/554km.
- Nov 17: Mostradas→(RS101)→Palmares do Sul→Cativari→(RS40)→Pinhal→(RS786)→Cidreira→Tramandaí→Capão da Canoa→Torres/PB1703-1713/B1344-1352/308km.
- Nov 18: Torres→(BR101)→Sombrio (SC)→Araranguá→Criciúma→Uruçanga→Lauro Müller→(Serra Geral)→Bom Jardim da Serra→Cruzeiro→São Joaquim (U-turn)→Cruzeiro→Urubici→Bom Retiro/Urubici/PB1714/B1353/303km.
- Nov 19: Bom Retiro/Urubici→Bom Retiro→Paraiso da Serra (U-turn)→Bom Retiro→Urubici→Bom Retiro/Urubici/PB1715-1717/B1354-1355/192km.
- Nov 20: Bom Retiro/Urubici→Bom Retiro→(BR282)→Índios→Otacílio Costa→(BR470)→Rio do Sul→Indaial→(BR418 to N)→Pomerode→Jaraguá do Sul→São Bento do Sul→Campo Alegre/PB1718-1719/B1356-1357/406km.
- Nov 21: Campo Alegre→São Bento do Sul→Agudos do Sul (PR)→Areia Branca do Assis→(BR116)→Quitandinho→(trail to N)→Contenda→(BR476)→Araucária→Curitiba (visited MBM)/PB1720-1722/B1358/201km.
- Nov 22: Curitiba→Jacupiranga (SP)→Registro→São Paulo (c/o Nagase)/none/none/425km.
- Nov 23: São Paulo (c/o Nagase)→São Paulo (visited GHSP).
- Nov 24: São Paulo >>>>

(The continuation of the locality and specimen codes, PB1723-1732 and B1359-1368, was used for the materials otherwise obtained.)

URUGUAY (Ando & Kanaya; 1, 150km)

Montevideo (c/o Udagawa).

Nov 25: Montevideo → (Rt. 1) → Pan de Azucar (MO) → San Carlos → Rocha (RA) → La Paloma (Isla de la Tuna, U-turn) → Rocha → (Rt. 15) → Velazquez → Lascano → (Rt. 14) → José P. Varela (LA) → (Rt. 8) → Treinta y Tres (TT) → Melo (CL) / PU502/U296/572 km.

Nov 26: Melo → (Rt. 7) → Centurion (U-turn) → Melo → Fraile Muerto → Cerro Chato → Cerro Colorado (FA) → Tala (CS) → San Jacinto → (Rt. 11/6) → Montevideo / PU503-510/U297-298/577km (c/o Udagawa).

Nov 27: Montevideo >>>>

(The continuation of the specimen code, U299, was used for the material otherwise obtained.)

ARGENTINA (Ando & Kanaya; 6, 283km)

Buenos Aires (visited SI) → Marcos Paz (c/o Aoki).

Nov 28: Marcos Paz (visited BAB).

Nov 29: Marcos Paz (BA) → Lujan → (N5) → Mercedes → Chivilcoy → 9 de Julio → Pehuajó → Trenque Lauquén → Santa Rosa (LP) / none / none / 622km.

Nov 30: Santa Rosa → General Acha → (N152) → Lihuel Calel → Puelches → Chelforó (RN) → General Rocha → Cipolletti / PA168-172 / A121-122 / 597km.

Dec 01: Cipolletti → (N151) → Cinco Saltos → Catriel → Argarrobo del Aguila → Santa Isabel → (P10) → Victorica → (dangerous trail) → Arizona (SL) → (N148) → Nueva Galia / PA173-176 / none / 664km.

Dec 02: Nueva Galia → Unión → La Maroma → Unión → Nueva Galia → (N148) → Buena Esperanza → Villa Mercedes → (N148) → San José del Morro → (P17) → La Esquina → La Toma / PA177-184 / A123-125 / 626km.

Dec 03: La Toma → Saladillo → San Luis → (N7) → La Paz (MDZ) → Mendoza → (P52) → Termas de Villavicencio → Uspallata / PA185-190 / A126-129 / 496km.

Dec 04: Uspallata → Cacheuta → Luján de Cuyo → Mendoza → (N7) → Palmira → (P41) → Nueva California → (N142) → Encón (SJ) → Las Casuarinas → Villa Santa Rosa → Caucete → (N141) → Marayes → (P510) → San Agustín de Valle Fértil / PA191-192 / A130-133 / 575 km.

Dec 05: San Agustín de Valle Fértil → (P510) → Los Baldecitos → Valle de la Luna → Los Baldecitos → (P26) → Villa Unión (LR) → (N40) → Los Tambillos → Sañogasta → Nonogasta → Chilecito / PA193 / A134 / 370km.

Dec 06: Chilecito → Famatina → Corrales (U-turn) →

Famatina → Chilecito → Nonogasta → (N74) → Patquía → (N38) → La Rioja / PA194-198 / A135-139 / 428km.

Dec 07: La Rioja → (N38) → Patquía → Chamental → Olta → Dique de Olta (U-turn) → Olta → Chamental → Chañar → Serrezuela (CO) → Villa de Soto → Cruz del Eje / PA199-204 / A140-143 / 488km.

Dec 08: Cruz del Eje → (P16) → Deán Funes → Villa Tumbamba → San José de la Dormida → (N9) → Villa del Totoral → Jesús María → Ascochinga → La Cumbre → (N38) → Cosquín / PA205-214 / A144-152 / 331km.

Dec 09: Cosquín → Tanti (U-turn) → Villa Carlos Paz → Alta Gracia → La Paisanita (U-turn) → Alta Gracia → Puesto de Cura (U-turn) → Alta Gracia → Despeñaderos → San Agustín → Almafuerite → Río Tercero → Villa Ascasubi → Oncativo → Manfredi (U-turn) → Oncativo → Oliva / PA215-222 / A153-160 / 339km.

Dec 10: Oliva → (N9) → Villa María → Bell Ville → Leones → Marcos Juárez → Inriville → Camilo Aldao → Los Surgentes → Corral de Bustos → Cavanagh → (N8) → Venado Tuerto (SF) → Colón (BA) → Pergamino / none / none / 509km.

Dec 11: Pergamino → Arrecifes → San Antonio de Areco → Pilar → Marcos Paz (c/o Aoki) / PA223-224 / A161-162 / 239km.

Dec 12: Marcos Paz.

Dec 13: Marcos Paz → Buenos Aires >>>> São Paulo (Brazil)

Dec 14: São Paulo >>>> Los Angeles (U.S.A.)

Dec 15: Narita.

1998 (Thirteenth exploration with Masashi Nomura and Jun Tsukahara as crews, total distance covered, 12, 150km, Fig. 4)

Nov 02: Narita >>>> Los Angeles (U.S.A.) >>>>

BRAZIL (Ando, Nomura & Tsukahara; 5, 037km)

Nov 03: São Paulo.

Nov 04: (Okubo) São Paulo → (BR116) → Jacupiranga → Registro → Curitiba (PR) / none / none / 394km.

Nov 05: Curitiba → Mandirituba → Mafra (SC) → Santa Cecília → São Cristovão do Sul → (BR470) → Otacílio Costa / PB1733-1734 / B1369-1370 / 372km.

Nov 06: Otacílio Costa → Agrolândia → Torre → Bocaina do Sul → (BR282) → Índios → Otacílio Costa / PB1735-1748 / B1371-1391 / 202km.

Nov 07: Otacílio Costa → Índios → Lages (Lajes) → Palmares → Otacílio Costa / PB1749-1756 / B1392-1402 / 173

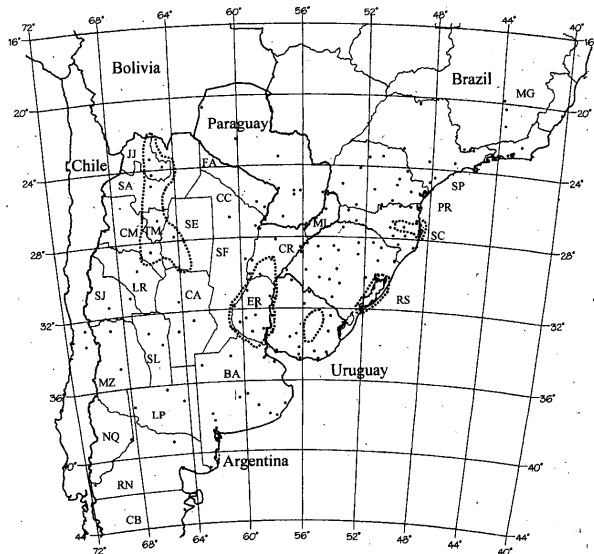


Fig. 4 Areas explored in 1998 (enclosures of broken line). Major towns are indicated by dots.

km.

Nov 08: Otacílio Costa→Índios→Bocaina do Sul→Bom Retiro→Alfredo Wagner→Rancho Queimado→São José→(BR101)→Porto Belo→Bombinhas/PB1757-1760/B1403/353km.

Nov 09: Bombinhas→(BR101)→Porto Belo→Florianópolis/PB1761-1764/B1404-1407/228km.

Nov 10: Florianópolis→(BR101)→Laguna→Araranguá→Torres (RS)→Tramandaí/PB1765/B1408/400km.

Nov 11: Tramandaí→Porto Alegre→(Koshizawa)→(BR116)→Camaquã→São Lourenço do Sul/none/none/420km.

Nov 12: São Lourenço do Sul/PB1766-1767/B1409-1411/61km.

Nov 13: São Lourenço do Sul→Pelotas→Rio Grande→(balsa)→São José do Norte→(BR101)→Bojurú→(dangerous route)→Mostardas/PB1768-1773/B1412-1414/338km.

Nov 14: Mostradas→Palmares do Sul→Capivari→Viamão→Vila Itapua (U-turn)→Porto Alegre→(BR 116)→Camaquã→São Lourenço do Sul/PB1774-1777/B1415-1417/545km.

Nov 15: São Lourenço do Sul/PB1778/B1418-1420/88 km.

Nov 16: São Lourenço do Sul/PB1779/none/5km.

Nov 17: São Lourenço do Sul→(BR116)→Camaquã→Porto Alegre→Ivoti→Caxias do Sul→Vacaria/none/none/460km.

Nov 18: Vacaria→Lages (Lajes, SC)→Santa Cecília→

Mafra→Mandirituba (PR)→Curitiba/PB1780/B1421/485km.

Nov 19: Curitiba→Jacupiranga (SP)→Registro→Juquiá→Piedade→Ibiúna (c/o Koshizawa)/PB1781-1783/none/407km.

Nov 20: Ibiúna→São Paulo.

Nov 21: São Paulo (visited GHSP).

Nov 22: São Paulo >>>>

(The continuation of the locality and specimen codes, PB1784-1787 and B1422, were used for the materials otherwise obtained.)

URUGUAY (Ando & Tsukahara; 667km)

Montevideo (c/o Udagawa).

Nov 23: Montevideo→(Rt. 6)→Santa Rosa (CS)→San Ramon→San Gabriel (FA)→Sarandi del Yí (DO)→Puntas de Mal Bajar→(Rt. 19)→Blanquillo→(balsa)→San Gregorio de Polanco (TO)/PU511-523/U300-307/297km.

Nov 24: San Gregorio de Polanco→(balsa)→Blanquillo (DO)→(obscure)→Elias Regules→(obscure)→Pueblo del Carmen→Durazno→(Rt. 5)→Florida (FA)→Canelones (CS)→Montevideo/PU524-530/U308/369km.

Nov 25: Montevideo >>>>

ARGENTINA (Ando & Tsukahara; 6,446km)

Buenos Aires (visited SI)→Marcos Paz (c/o Aoki).

Nov 26: Marcos Paz (visited BAB).

Nov 27: Marcos Paz→Zárate→(N12)→Ceibas (ER)→(N14)→Gualeduaychú→El Ñandubaysal (U-turn)→Puerto Boca (U-turn)→Gualeduaychú→(N14)→Concepción de Uruguay/PA225-228/A163-166/475 km.

Nov 28: Concepción de Uruguay→(N14)→Colón→Playa Norte (U-turn)→Colón→Concórdia→Salto Grande/PA229-235/A167-171/331km.

Nov 29: Salto Grande→Colonia Ayuí→Federación→Chajarí→(N14)→Mocoretá (CR)→Curuzú Cuatiá→Perogorria→(P126)→Sauce/PA236-243/A172-179/402km.

Nov 30: Sauce→San José de Feliciano (ER)→(P1)→Estacas→Paso Yunque (U-turn)→Estacas→La Paz→Santa Elena (U-turn)→La Paz/PA244-252/A180-185/341km.

Dec 01: La Paz→Colonia Maximo Castro (U-turn)→La Paz→(N12)→Gdor. Racedo→Paraná→(P11)→Oro Verde→Aldea Valle María→Diamante/PA253-260/

A186-192/301km.
 Dec 02: Diamante→(P11)→Victoria→(P26)→Nogoyá
 →Lucas González→Rosario del Tala→Basavilbaso→
 (P20)→Gilbert→Urdinarrain→(P51)→Larroque→(P
 16)→Guauguay→Puerto Ruiz→Guauguay/PA261-
 266/A193-198/405km.
 Dec 03: Guauguay→(P16)→Larroque→(P16/P14)→
 Ceibas→Zárate (BA)→(N9)→Baradero→(P41)→
 San Andrés de Giles→Luján→Marcos Paz (c/o
 Aoki)/PA267/A199/439km.
 Dec 04: Marcos Paz→Buenos Aires >>>> Salta (SA)/
 PA268/none.
 Dec 05: Salta→(N9)→La Caldera→El Carmen (JJ)→
 San Salvador de Jujuy→(N9)→Yala→Laguna de
 Yala (U-turn)→Yala→Tumbaya→Tilcara→Huma-
 huaca/PA269-275/A200-201/283km.
 Dec 06: Humahuaca→(P13)→Hipolito Yrigoyen→Iruya
 (U-turn)→Hipolito Yrigoyen→(N9)→Tres Cruces
 →Abra Pampa→La Quiaca/PA276-280/A202/270km.
 Dec 07: La Quiaca→Yaví→Abra de Lizoite→Santa Vic-
 toria (SA, U-turn)→Abra de Lizoite→Yaví (JJ)→
 La Quiaca/PA281-287/A203/240km.
 Dec 08: La Quiaca→(N9)→Abra Pampa→Tres Cruces
 →Humahuaca→Tumbaya→Yala→San Salvador de
 Jujuy→(P56)→Zapla→Mendieta→San Pedro de Ju-
 juy/PA288-291/A204-206/365km.
 Dec 09: San Pedro de Jujuy→(P1)→El Piquete→El
 Palmar→Las Siete Águas→Palma Sola→Santa Bár-
 bara→Santa Clara→(P1)→San Lucas→(N34)→
 Pampa Blanca→General Güemes (SA)→(N9)→Salta
 →(N68)→Cerrillos→Cnl. Moldes→(P47)→Cabra
 Corral/PA292-301/A207-212/440km.
 Dec 10: Cabra Corral→Cnl. Moldes→(N68)→La Viña→
 Alemania→Cafayate→(N40)→Tolombón→El Baña-
 do (TM)→(P307)→Amaichá del Valle→Tafí del
 Valle→Soldado Maldonado→Concepción/PA 302-
 310/A213-215/355km.
 Dec 11: Concepción→(N38)→Alto Verde→Alpachiri→
 Rio Potrero (CM)→Buena Vista→Água de las Pal-
 mas→Andalgará→(P46)→Saujil→(P46/N60)→
 Chumbicha→(N38)→Huillapima→Catamarca→El
 Portezuelo→(P42)→Vilismán→?→El Alto/PA311-
 325/A216-221/532km.
 Dec 12: El Alto→Las Cañas→(N64)→Lavalle (SE)→
 Santa Catalina→(P24)→Va. La Punta→La Plida→
 San Martín (Loreto)→Rio Dulce (U-turn)→San

Martín (Loreto)→(N9)→Ojo de Agua→Cachi (U-
 turn)→Ojo de Agua→Sumampá (U-turn)→Ojo de
 Agua→(N9)→San Martín (Loreto)→Arraga→San-
 tiago del Estero/PA326-333/A222-225/675km.
 Dec 13: Santiago del Estero→(N9)→Termas de Río
 Hondo→Banda del Río Salí→(P304)→Alderetes (U-
 turn)→Banda del Río Salí→(N9)→San Miguel de
 Tucumán→Tapia→Las Tipas (U-turn)→Tapia→(N
 9/P311)→San Pedro de Colalao (U-turn)→(P311/N
 9)→Trancas→Rosario de la Frontera (SA)→Metán
 →General Güemes→Salta/PA334-342/A226-231/564
 km.
 Dec 14: Salta >>>> Buenos Aires→Marcos Paz (c/o
 Aoki).
 Dec 15: Marcos Paz.
 Dec 16: Marcos Paz→Buenos Aires >>>> São Paulo
 (Brazil).
 Dec 17: São Paulo >>>> Los Angeles (U.S.A.) >>>>
 Dec 18: Narita.
 (The continuation of the locality and specimen codes,
 PA343-350 and A232-240, were used for the materi-
 als collected by Hisashi Kokubun who stayed at that
 time in Argentina as a JICA expert.)
 1999 (Fourteenth exploration with Satoshi Manabe,
 Takahiro Omori and Takuya Hiram as crews; total
 distance covered, 4,451km; Fig. 5)
 Nov 10: Narita >>>> Los Angeles (U.S.A.) >>>>
 Nov 11: São Paulo (Brazil) >>>>

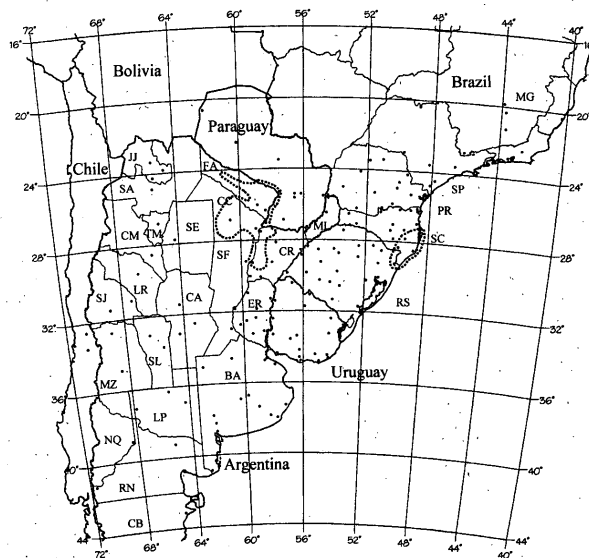


Fig. 5 Areas explored in 1999 (enclosures of broken line). Major towns are indicated by dots.

- ARGENTINA (Ando, Manabe & Omori; 3, 045km)
 Buenos Aires→Villa del Parque (c/o Nishimura).
 Nov 12: Villa del Parque (visited BAB).
 Nov 13: Villa del Parque→Buenos Aires >>>> Corrientes (CR)→Paso de la Patria.
 Nov 14: Paso de la Patria→Corrientes→Resistencia (CC)→(N11)→Margarita Belén→Gral. L.V. Mansilla (FA)→Tatané→Formosa/PA351-352/A241-243/189 km.
 Nov 15: Formosa→(P2)→Mojón de Fierro→Timbo Porá→Cnia. Dalmacia→Rcho. Inglés o Araguay (U-turn)→Cnia. Dalmacia→Timbo Porá→(N11)→Clorinda/PA353-361/A244-248/266km.
 Nov 16: Clorinda→(N86)→Palma Sola→Laguna Blanca→Espinillo→General M. Belgrano→Va. General Güemes→(N95)→Pavao→Comandante Fontana→(N81)→Palo Santo→Pirané/PA362-365/none/394km.
 Nov 17: Pirané→(N81)→Palo Santo→Comandante Fontana→Ibarreta→Estanislao del Campo→(P24)→Ranero Cué (U-turn)→Estanislao del Campo→(N81)→Las Lomitas→J.G. Bazan (U-turn)→(the same way)→Pirané/PA366-373/A249-251/508km.
 Nov 18: Pirané→(P3)→El Salado→El Colorado→Presidencia Roca (CC)→Pampa del Índio→Fortín Lavalle→(P5)→Castelli→Trés Isletas→(N95)→Sáenz Peña/PA374-384/A252-257/387km.
 Nov 19: Sáenz Peña→(N95)→La Tigra→San Bernardo→Va. Angela→(N89)→Enrique Urien→Samuhú→Haumonia (U-turn)→Samuhú→Va. Berthet→San Bernardo→(P6)→Las Breñas→(P94)→Campo Largo→Saenz Peña/PA385-398/A258-259/382km.
 Nov 20: Saenz Peña→(N16)→Quitilipi→(P4)→Pampa Verde→(P9)→Las Garcitas→Colonias Unidas→(P7)→General J. de San Martín→(P90)→La Eduvigis→(N11)→Resistencia/PA399-406/A260-266/284km.
 Nov 21: Resistencia→Corrientes (CR)→(N12)→Empedrado→San Lorenzo→(P27)→Bella Vista→Santa Lucia→Goya/PA407-415/A267-270/292km.
 Nov 22: Goya→(N12/P24)→Río Corrientes (U-turn)→(P24/N12/N123)→Arroyo Betel (U-turn)→(N123/N12)→San Roque→San Lorenzo→Empedrado→Corrientes→(P5)→San Luis del Palmar→Paso de la Patria/PA416-421/A271-273/343km.
 Nov 23: Paso de la Patria→Corrientes >>>> Buenos Aires→Villa del Parque (c/o Nishimura).
 Nov 24: Villa del Parque.
 Nov 25: Villa del Parque→Buenos Aires >>>>
 (The continuation of the locality and specimen codes, PA422-424 and A274, were used for the material collected by Hisashi Kokubun.)
 BRAZIL (Ando & Manabe; 1, 406km)
 Florianópolis (SC).
 Nov 26: (Koshizawa) Florianópolis→São José→(BR 282)→Rancho Queimado→Alfredo Wagner→Bom Retiro→Canoas (U-turn)→Bom Retiro/PB1788-1789/B1423/250km.
 Nov 27: Bom Retiro→Urubicí→Rio Rufino→Urupema→Santa Isabel→São Joaquim/PB1790-1794/B1424-1427/166km.
 Nov 28: São Joaquim→Cruzeiro→Bom Jardim da Serra→(Serra Geral) (U-turn)→Bom Jardim da Serra→(trail to S)→Silveira (RS)→São José dos Ausentes/PB1795-1801/B1428-1437/162km.
 Nov 29: São José dos Ausentes→Ouro Verde→Bom Retiro→Jaquirana→Várzea do Cedro→Tainhas→Cambará do Sul/PB1802-1815/B1438-1455/192km.
 Nov 30: Cambará do Sul→Fortaleza→Cambará do Sul→Tainhas→Cambará do Sul/PB1816-1822/B1456-1464/92km.
 Dec 01: Cambará do Sul→Praia Grande (SC)→(BR 101)→Sombrio→Araranguá→Morro dos Conventos (U-turn)→Araranguá→Tubarão→Laguna→Imbituba/PB1823-1825/B1465-1469/284km.
 Dec 02: Imbituba→(BR 101)→Florianópolis/PB1826-1827/none/260km.
 Dec 03: Florianópolis >>>> São Paulo.
 Dec 04: São Paulo (visited GHSP).
 Dec 05: São Paulo >>>> Los Angeles (U.S.A.) >>>>
 Dec 06: Narita.
 2000 (Fifteenth exploration with Makoto Nakano and Nobuyuki Ishikawa as crews; total distance covered, 7,708km; Fig. 6)
 Nov 08: Narita >>>> Los Angeles (U.S.A.) >>>>
 Nov 09: São Paulo (Brazil) >>>>
 ARGENTINA (Ando, Nakano & Ishikawa; 6, 086km)
 Buenos Aires→Villa del Parque (c/o Nishimura).
 Nov 10: Villa del Parque (visited BAB).
 Nov 11: Villa del Parque (BA)→(General Paz/P215)→Coronel Brandsen→San Miguel del Monte→(N3)→Las Flores→Cacharí→Azul→(P76)→Sierras Bayas (U-turn)→Olavarría/PA425-427/A275-276/537km.

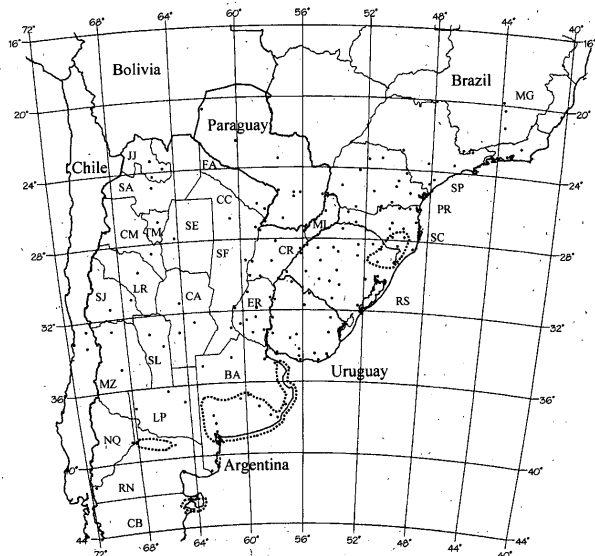


Fig. 6 Areas explored in 2000 (enclosures of broken line). Major towns are indicated by dots.

Nov 12: Olavarría→Loma Negra→16. de Julio (U-turn)→(P76/P85)→Coronel Suárez→Pigüé→Puán→Azopardo→Alta Vista→Goyena→Sierra de Pigüé (U-turn)→Pigüé→Abra del Hinojo→Coronel Suárez/PA428-433/A277-280/531km.

Nov 13: Coronel Suárez→(P85/P76/P72)→Sierra de la Ventana→Saldungaray→(obscure)→Tornquist→(P76)→Sierra de la Ventana (U-turn)→Tornquist→(N3)→Bahía Blanca/PA434-435/A281-282/361km.

Nov 14: Bahía Blanca→(N22)→Juan Couste→Río Colorado (RN)→Choele Choel→Chelforó→General Roca→Cipolletti/none/none/552km.

Nov 15: Cipolletti→Neuquen (NQ)→Cipolletti (RN)→Allen (U-turn)→(N22)→Paso Cordoba (U-turn)→Chichinales→Río Negro (U-turn)→Chichinales→Chelforó→Choele Choel/PA436-438/A283/369km.

Nov 16: Choele Choel→(N250/P2)→San Antônio Oeste→(N3)→Sierra Grande→Puerto Madryn (CB)→Puerto Pirámide/PA439-441/none/none/589km.

Nov 17: Puerto Pirámide→Punta Delgada→Punta Cero→Puerto Pirámide→(N3)→Sierra Grande (RN)→San Antônio Oeste→Viedma→Carmen de Patagones (BA)→Bahía Blanca/PA442-444/none/960km.

Nov 18: Bahía Blanca→Punta Alta→Pehuén-Co (U-turn)→Monte Hermoso (U-turn)→Coronel Dorrego→(N3)→Oriente→Balneario Oriente (U-turn)→Oriente→Copetonas→Reta (U-turn)→Copetonas→(N3)→Tres Arroyos/PA445-449/A284/560km.

Nov 19: Tres Arroyos→(N3)→Adolfo Gonzáles

Chaves→Benito Juárez→(P74)→Tandil (Cerro el Centinela, Sierra del Tigre, Cerro Movediza)→(N226)→Balcarce/PA450-457/A285-291/394km.

Nov 20: Balcarce→Los Pinos→(obscure)→Paraje El Pampero→(P227)→Dos Naciones→Paraje El Pampero→(P227)→Lobería→El Moro→Las Nutrias→Los Pinos→Balcarce→Estancia Volcan (from P55, U-turn)→Estancia Volcan (from N226, U-turn)→Balcarce/PA458-461/A292/335km.

Nov 21: Balcarce→(N226)→Laguna La Brava (U-turn)→(N226)→Mar del Plata→Miramar (U-turn)→Mar del Plata→(P11)→Santa Clara del Mar→Villa Gasell/PA462-464/none/328km.

Nov 22: Villa Gasell→(P11)→Pinamar→(P74)→General J. Madariaga→(P56)→General Conesa→Cerro de la Gloria→Punta Piedras→Verónica→Monte Veloz (U-turn)→Verónica→Magdalena→La Plata→Villa del Parque (c/o Nishimura)/PA465-470/A293-296/540km.

Nov 23: Villa del Parque.

Nov 24: Villa del Parque.

Nov 25: Villa del Parque→Buenos Aires >>>>

BRAZIL (Ando & Nakano; 1, 622km)

Porto Alegre (RS).

Nov 26: (Nagase) Porto Alegre→Vila Itapuã (U-turn)→Porto Alegre→(BR116)→Canoas→Caxias do Sul/PB1828-1830/B1470-1471/311km.

Nov 27: Caxias do Sul→Farroupilha→Garibaldi→São Roque Figueira de Mello (U-turn)→Garibaldi→Farroupilha→Caxias do Sul→(RS230)→Vila Seca→(trail to N)→Fazenda do Ilheus→São Jorge→Criuva→São Manoel→(BR116)→Vacaria/PB1831-1837/B1472-1481/233km.

Nov 28: Vacaria→(BR116)→Santo Antônio das Pelotas (SC)→Fazenda Butiá→(trail to SE)→São Jorge (not found in map, U-turn)→(trail to N)→Lages (Lajes)→Painel→São Joaquim/PB1838-1842/B1482-1489/281km.

Nov 29: São Joaquim→Cruzeiro→Pericó→Urubici→Rio Rufino→Urupema→Painel→São Joaquim/PB1843-1847/B1490/236km.

Nov 30: São Joaquim→(trail to WS)→Chapada Bonia→Estanciado Meio (U-turn)→Arboredo (not found in map)→São Francisco Xavier→Boa Ventura (RS, not found in map)→São José dos Ausentes/PB1848-1855/B1491-1501/170km.

Dec 01: São José dos Ausentes→Boa Ventura (U-turn)→São José dos Ausentes→Timbé do Sul (SC)→Turvo→Ermo→(BR101)→Torres (RS)→Imbé→Tramandaí/PB1856-1863/B1502-1509/254km.

Dec 02: Tramandaí→Osório→Porto Alegre >>>> São Paulo/none/none/118km.

Dec 03: São Paulo (visited GHSP).

Dec 04: São Paulo.

Dec 05: São Paulo >>>> Los Angeles (U.S.A.) >>>>

Dec 06: Narita.

2001 (Sixteenth exploration with Taku Nakajima and Takahiro Omori as crews; total distance covered, 8,451km; Fig. 7)

Nov-07: Narita >>>> Los Angeles (U.S.A.) >>>>

BRAZIL (Ando; 0km)

Nov 08: São Paulo (c/o Hiranaka).

Nov 09: São Paulo (c/o Hiranaka).

Nov 10: São Paulo (visited GHSP).

Nov 11: São Paulo >>>>

PARAGUAY (Ando, Nakajima, Omori & Nolida Soria; 4,748km)

Asunción.

(The locality and specimen codes, PP1 and P1, were used for the material otherwise obtained.)

Nov 12: Asunción (visited FCQ and PY).

Nov 13: (Uto) Asunción→(N9)→Villa Hayes (HS)→Pozo Colorado→Filadelfia (BN)→Loma Plata/PP2-3/none/532km.

Nov 14: Loma Plata→Filadelfia→Neuland→Picada Plantanillos (U-turn)→Neuland→(N9)→Toledo→Laguna Negra (U-turn)→Neuland (U-turn)→Filadelfia/PP4-7/P2/369km.

Nov 15: Filadelfia→(N9)→Pozo Colorado (HS)→Villa Hayes→Asunción (CL)/none/none/507km.

Nov 16: Asunción→San Lorenzo→(N1)→Itá→Yaguarón (PI)→Paraguarí→Jardin Pirareta (CA, U-turn)→Piribebuy→(N2)→Eusebio Ayala→Isla Pucu→Caragatay→Primero de Marzo (U-turn)→Caragatay→Vapor-Qué/PP8-14/P3-9/238km.

Nov 17: Vapor-Qué→Caragatay→Isla Pucu→Eusebio Ayala→(N2)→Caacupé→Atyrá (U-turn)→Caacupé→Tobatí→Arroyos y Esteros→Emboscada→Limpio (CL)→Luque→Asunción/PP15-20/P10-14/246km.

Nov 18: Asunción.

Nov 19: Asunción→Nemby→Ypané→Villeta (U-turn)→Nueva Italia (U-turn)→Guarambaré→Itá→Itaguá→Ypacaraí→San Bernardino→Altos→Loma Grande (U-turn)→Altos→San Bernardino→Ypacaraí→Aregúa→Capiatá→San Lorenzo→Asunción/PP21-28/P15-20/287km.

Nov 20: Asunción→(N1)→Itá→Yaguarón (PI)→Paraguarí→Carapegua→Acahay→Ybycuí (U-turn)→Acahay→Carapegua→(N1)→San Roque G. de Santa Cruz→Quiindy→Caá Pucú→Villa Florida (LM)→San Juan Bautista→San Ignacio→(N4)→Pilar/PP29-33/P21-23/536km.

Nov 21: Pilar→(N4)→San Ignacio→(N1)→Santa Rosa de la Misiones (U-turn)→(N1)→General Delgado (IA)→Coronel Bogado→Carmen del Paraná→Encarnación/PP34-38/P24-27/380km.

Nov 22: Encarnación→(N1)→La Paz (Colonia Fram)→(N6)→Trinidad→Hohenau→Puerto Hohenau (U-turn)→Hohenau/PP39-45/P28-31/226km.

Nov 23: Hohenau→entrance of Pirapó→Colonia Capitán Meza→Capitán Meza (U-turn)→Colonia Capitán Meza→Natalio→Kilometro 16→Kilometro 14→San Rafael del Paraná (U-turn)→Kilometro 14→Kilometro 16→Barrio Santo Domingo→Arq. Tomás Romero→(N6)→Santa Rita (AP)→(N7)→Yguazú/PP46-47/P32/386km.

Nov 24: Yguazú→(N7)→Ciudad del Este→Tres Fronteras (U-turn)→Ciudad del Este→Yguazú→Caaguazú (CG)→Maurieio José Troche (GA)→Colonia Independencia (U-turn)→Mbocayaty→Villa-

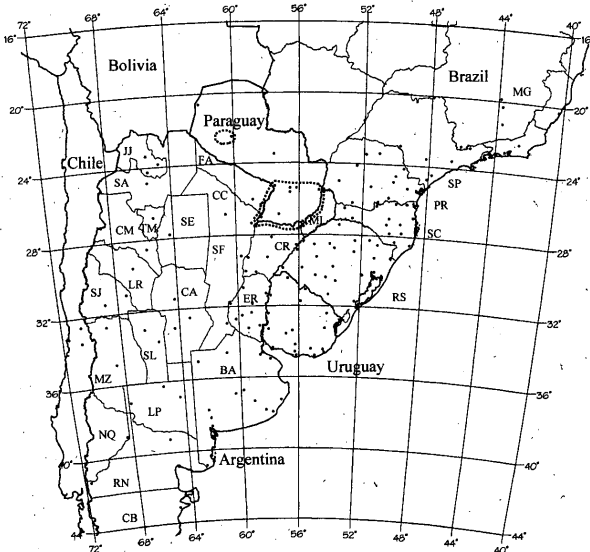


Fig. 7. Areas explored in 2001 (enclosures of broken line). Major towns are indicated by dots.

- rrica/PP48-49/P33/380km.
- Nov 25: Villarrica → (N8) → Ñumi → Caazapá (CZ) → Rio Pirapo (U-turn) → Caazapá → Maciel → Moisés Bertoni (U-turn) → Maciel → Caazapá → Ñumi (GA) → San Juan Nepomuceno (CZ) → San Carlos (U-turn) → San Juan Nepomuceno → Abaí (U-turn) → San Juan Nepomuceno → Ñumi (GA) → Villarrica/PP50-52/none/345km.
- Nov 26: Villarrica → (N8) → Coronel Martínez → Ybytí (PI) → General Bernardino Caballero → Sapucaí → General Bernardino Caballero → La Colmena/PP53-62/P34-37/140km.
- Nov 27: La Colmena → Acahay → Carapegua → Paraguari → (N1) → Itá → (CL) → San Lorenzo → Asunción/PP63/P38/190km.
- Nov 28: Asunción (visited FCQ).
- Nov 29: Asunción >>>>
- ARGENTINA (Ando, Nakajima & Renee Fortunato; 3,703km)
- Buenos Aires → Villa del Parque (c/o Nishimura).
- Nov 30: Villa del Parque (visited BAB).
- Dec 01: Villa del Parque → Buenos Aires >>>> Comodoro Rivadavia (CB) → (N3) → Caleta Olivia (SC) → Fitz Roy → (N281) → Jaramillo → Puerto Deseado/PA471/none/304km.
- Dec 02: Puerto Deseado → (N281) → Tellier → (P14/P91) → Cabo Blanco (U-turn) → Tellier → (N281) → Jaramillo → (N3) → Tres Cerros → El Sarado → Puerto San Julián/PA472-479/A297/491km.
- Dec 03: Puerto San Julián → (N3) → Piedra Buena → (N3/P9/P11) → El Calafate/PA480-489/A298-302/456km.
- Dec 04: El Calafate → Cabañas Ventisquero Moreno (U-turn) → Punta Bandera (U-turn) → El Calafate → (P11) → El Cerrito (U-turn) → El Calafate/PA490-497/A303/357km.
- Dec 05: El Calafate → (P11) → El Cerrito → (P5) → Esperanza → Güer Aike → (N3) → Río Gallegos/PA495-500/none/310km.
- Dec 06: Río Gallegos → Punta Loyola (U-turn) → Río Gallegos → Güer Aike → (P55) → Estancia Cabo Buen Tiempo (U-turn) → Estancia Los Pozos (U-turn) → (P55/N3/N288) → Puerto Santa Cruz/PA501-504/none/456km.
- Dec 07: Puerto Santa Cruz → Piedra Buena → (N288) → Estancia La Julia → (P27) → Gobernador Gregores → Point 33km west (U-turn) → Gobernador Gregores/PA505-511/A304-307/296km.
- Dec 08: Gobernador Gregores → (P25) → Bella Vista → Puerto San Julián → Playa La Mina (U-turn) → Puerto San Julián/PA512-517/A308-311/273km.
- Dec 09: Puerto San Julián → (N3) → Tres Cerros → (P87/P47) → Estancia Laura → Tellier → Puerto Deseado/PA518-525/A312-319/317km.
- Dec 10: Puerto Deseado → Gruta de Laurdes (U-turn) → Jaramillo → (N3) → Caleta Olivia → Comodoro Rivadavia (CB) → Estancia La Begonia → (P37, dangerous route) → Pampa del Castillo → (N26) → Comodoro Rivadavia/PA526-530/none/423km.
- Dec 11: Comodoro Rivadavia >>>> Buenos Aires → Villa del Parque (c/o Nishimura).
- Dec 12: Villa del Parque.
- Dec 13: Villa del Parque → Buenos Aires >>>> São Paulo (Brazil).
- Dec 14: São Paulo >>>> Los Angeles (U.S.A.) >>>>
- Dec 15: Narita.

DISCUSSION

During the exploration for seven seasons from 1995 to 2001, 858 different herbarium specimens (210 specimens from Argentina, 595 from Brazil, 1 from Mexico, 37 from Paraguay and 15 from Uruguay) were collected, and the total distance covered was 69,193km (27,123km in Argentina, 31,308km in Brazil, 2,349km in Mexico, 4,748km in Paraguay, 840km in Peru, and 2,825km in Uruguay).

The cumulative summary of the exploration from 1995 to 2001 (present record) as well as from 1988 to 1994 (a previous paper [2]) is shown in Table 1. The distance covered in the second seven-year period (from 1995 to 2001, 69,193km) is larger than that in the first seven-year period (from 1988 to 1994, 63,584 km), but the number of collected specimens was reduced considerably, from 1,215 to 858.

During the first seven-year period, we have focused main attention to Uruguay and Brazil in which *Petunia* plants occur abundantly. The most important area was the three southernmost states of Brazil (Paraná, Santa Catarina and Rio Grande do Sul States), which seem the center of *Petunia sensu* Jussieu. Because of the abundance, it was rather easy to encounter a *Petunia*

species in Brazil, where we could observe and collect specimens at the natural population established at every 47km of driving course on average (calculated from Table 1). In Uruguay, the average distance to do that was 83km, reflecting the fact that the distribution of *Petunia* is less dense there. In Argentina and Paraguay, furthermore, it was necessary to drive 205 and 132km, respectively, to encounter a population of *Petunia*. In these areas, species of limited number occurs sparsely in wide regions. It is likely that these countries lie in outskirts of the distribution.

During the first several years of the second seven-year period, we targeted Brazil as main study area, then shifted gradually to Argentina. The exploration of Uruguay was only supplemental. We estimate that we have studied most of the distribution range in Brazil and about half of that in Argentina. We explored Paraguay only once in 2001, but the result seems satisfactory in terms of the area covered. We also explored Peru and Mexico, but did not encounter any *Petunia sensu* Jussieu but one species in Mexico. Bolivia still remains uncharted in our *Petunia* distribution map.

ACKNOWLEDGEMENT

This work could not have been accomplished without the kind assistance of Mr. Masao Udagawa of Montevideo, Uruguay; Mr. Sebastião T. Nagase, Mr. Nobuyuki Hiranaka, Mr. Tomio Koshizawa, Mr. Hideo Okubo, and Mr. Roberto H. Okubo of São Paulo, Brazil; and Mr. Tsuguyoshi Aoki, Mr. Angel Aoki, Mr. Irie and Ms. Keiko Nishimura of Buenos Aires, Argentina; Mr. Yukihiro Saito, Santiago, Chile; Mr. Naoyuki Kato of Mexico City, Mexico, for surveying natural habitats of *Petunia*.

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Table 1 Cumulative summary of locality-codes, specimen-codes and distance covered.

	Argentina			Brazil			Uruguay			Others			Total		
	locality	specimen	km	locality	specimen	km	locality	specimen	km	locality	specimen	km	locality	specimen	km
1988	1	1-2*		1-70	1-62	2,156	1-154	1-84	5,325				224	146	7,481
							155-181	85-95*		Chile			28	13	
1989				71-146	63-146	2,825	182-266	96-153	3,025	1-24	none	1,486	185	142	7,336
				147-155	147-155**										
1990	2-40	3-19	2,184	156-219	156-228	1,963	267-372	154-206	5,569				209	143	9,716
	41-99	20-99***													
1991	100-137	100-109	1,296	220-403	229-358	6,818	373-420	207-256	2,423				270	190	10,537
1992				404-557	359-487	5,747	421-466	257-272	3,565				200	145	9,312
1993				558-871	488-731	9,719	467-496	273-292	1,623				344	264	11,342
1994				872-1123	732-903	7,860							252	172	7,860
Subtotal	78	29	3,480	1,114	894	37,088	496	292	21,530	24	0	1,486	1,712	1,215	63,584
										Mexico					
1995	138-167	110-120	1,560	1124-1353	904-1079	7,358	497-500	293-295	1,008	1-42	1	2,027	264	191	11,953
1996				1354-1584	1080-1252	8,711				none	none	322	285	173	9,873
										Peru					
										1-12	none	840			
1997	168-224	121-162	6,283	1585-1722	1253-1358	7,174	501-510	296-298	1,150				205	151	14,607
				1723-1732	1359-1368**			299**							
1998	225-342	163-231	6,446	1733-1783	1369-1421	5,037	511-530	300-308	667				189	131	12,150
	343-350	232-240*		1784-1787	1422**								8	9	
1999	351-421	241-273	3,045	1788-1827	1423-1469	1,406							111	80	4,451
	422-424	274*											3	1	
2000	425-470	275-296	6,086	1828-1863	1470-1509	1,622				Paraguay			82	-62	7,708
										1	1**				
2001	471-530	297-319	3,703							2-63	2-38	4,748	122	60	8,451
Subtotal	393	210	27,123	726	595	31,308	34	15	2,825	116	38	7,937	1,269	858	69,193
Total	471	239	30,603	1,840	1,489	68,396	530	307	24,355	140	38	9,423	2,981	2,073	132,777

*materials collected by Hisashi Kokubun. **materials otherwise obtained. ***not used.

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摘 要

後続の研究者の便宜に供するため、花卉園芸学研究室によって1988年以来行われてきた南米での植物探査の記録を残すこととする。探査はナス科*Petunia*属に傾注している。但し、Jussieu(1803)の定義した広義の*Petunia*であり、狭義の*Petunia* (*sensu* Wijsman)属と*Calibrachoa*属を含んでいる。1995年から2001年までの7年間の全走行距離は69,191km(アルゼンチン=27,123km, ブラジル=31,308km, メキシコ=2,347km, パラグアイ=4,748km, ペルー=840km, ウルグアイ=2,825km)に達し、採集した標本は合計858点(アルゼンチン=210点, ブラジル=595点, メキシコ=1点, パラグアイ=37点, ウルグアイ=15点)に達した。前報[2]に記録した1988年~1994年に比べて、走行距離は上回るものの、採集標本数は大幅に減少した。分布の周辺部分の探査に入ったからである。最初の2~3年はブラジルに重点を置き、以降次第にアルゼンチンに重点を移した。ウルグアイの探査は補完的なものに留めた。ブラジルの探査は峠を越え、アルゼンチンの探査は道半ばである。パラグアイは2001年だけの探査だが、概ね満足できる結果を得ている。メキシコの探査は僅か1標本の確保に留まった。ペルーの探査は成果がなかった。ボリビアの探査はまだ行われていない。