

University, Zenpukuji 2, Suginami, Tokyo, 167-8585, Japan, and BAYU ADJIE, Bali Botanic Garden, Indonesian Institute of Science, Baturiti, Tabanan, Bali, 82191, Indonesia.

Contribution to the Pteridophyte Flora of Puerto Rico.—Despite its age, Proctor's *Ferns of Puerto Rico and the Virgin Islands* (1989) is the most utilized taxonomic treatment used by pteridologists to identify Puerto Rican ferns. In order to keep the taxonomy current, we are reporting twenty new ferns that are Puerto Rican municipio records. During the course of our fieldwork we visited more than 60 of Puerto Rico's 76 municipios, and our collection ranged from the coastal lowlands to the central Cordillera Mountains. The new pteridophyte records were collected in thirteen different municipios, mostly from the central portion of the island and a few from the southeast coast (Fig. 1). Previous Puerto Rican distributions for these taxa were obtained from Proctor (*Ferns of Puerto Rico and the Virgin Islands*. Mem. New York Bot. Gard. 53:1–389. 1989), Barcelona (Systematics of the fern genus *Odontosoria sensu lato* (Lindsaeaceae). Ph.D. dissertation, Department of Botany, Miami University, Oxford, Ohio. 2000), and Shaw *et al.* (New Records for Puerto Rican Pteridophytes. Fern Gaz. 17(2): 97–99. 2004.). Because most of the new records were collected in the central region of Puerto Rico this suggest that this area may be under sampled. The following records are arranged alphabetically by municipios and the specimens are housed at the Willard Sherman Turrell Herbarium (MU) at Miami University.

Adjuntas: *Psilotum nudum* (L.) P. Beauv. Record voucher: Puerto Rico, Municipio de Adjuntas growing in Adjunta at the base of a palm tree on the front lawn of a house northwest of the hotel Monte Rio at an elevation of 479 m, N 18° 09' 44.2" W 66° 43' 33.8". Collected 23 May 2006 by S.W. Shaw, M.S. Barker # 489, and S.V. Sprunt. Previously known Puerto Rico distribution: Arecibo, Bayamón, Dorado, Juana Díaz, Maricao, Ponce, and Quebradillas. Of wide occurrence but not often collected.

Arecibo: *Pteris vittata* L. Record voucher: Puerto Rico, Municipio de Arecibo, growing along a muddy wall along the side of Rt. 623 at an elevation of 183 m, N 18° 23' 32.7" W 66° 42' 38.6". Collected 20 May 2006 by S.W. Shaw, M.S. Barker # 457, and S.V. Sprunt. Previously known Puerto Rico distribution: Camuy, Isabela, Ponce, San Juan, and Vega Alta. Very widespread but not often collected.

Hatillo: *Microgramma lycopodioides* (L.) Copel. Record voucher: Puerto Rico, Municipio de Hatillo, growing on a tree alongside Rt. 134 near the driveway to Bayaney Dairy Inc. at an elevation of 305 m, N 18° 21' 18.3" W 66° 48' 49.1". Collected 20 May 2006 by S.W. Shaw, M.S. Barker # 459, and S.V. Sprunt. Previously known Puerto Rico distribution: Arecibo, Cayey, Dorado, Gurabo, Jayuya, Luquillo, Manatí, Maricao, Naguabo, Salinas, San Germán, Utuado, Yabucoa, and Yauco. Of wide occurrence. ***Nephrolepis hirsutula* (G. Forst.) C. Presl.** Record voucher: Puerto Rico, Municipio de Hatillo, growing on a tree

Puerto Rico



FIG. 1. Twenty new fern records were collected in thirteen different municipios. The municipios are as follow: 1 Adjuntas, 2 Arecibo, 3 Hatillo, 4 Isabela, 5 Jayuya, 6 Maricao, 7 Maunabo, 8 Morovis, 9 Patillas, 10 Ponce, 11 San Juan, 12 San Sebastian, and 13 Vega Baja. The map is modified from Proctor's *Ferns of Puerto Rico and the Virgin Islands* (1989).

alongside Rt. 134 near the driveway to Bayaney Dairy Inc. at an elevation of 305 m, N 18° 21' 18.3" W 66° 48' 49.1". Collected 20 May 2006 by S.W. Shaw, M.S. Barker # 458, and S.V. Sprunt. Previously known Puerto Rico distribution: Arecibo, Barranquitas, Bayamón, Cabo Rojo, Guaynabo, Gurabo, Jayuya, Manatí, Mayagüez, Naguabo, Orocovis, Patillas, Ponce, Quebradillas, Río Grande, San Juan, Toa Baja, Utuado, and the islands of Culebra, Mona, and Vieques. Occurs all over the island.

Isabela: *Thelypteris grandis* A.R. Sm. Record voucher: Puerto Rico, Municipio de Isabela, growing along the ground near the roadside of Rt. 446 near the southern edge of Bosque Estatal De Guajataca at an elevation of 262 m, N 18° 24' 13.4" W 66° 58' 04.0". Collected 20 May 2006 by S.W. Shaw, M.S. Barker # 466, and S.V. Sprunt. Previously known Puerto Rico distribution: Adjuntas, Arecibo, Barranquitas, Bayamón, Cayey, Ciales, Florida, Jayuya, Lares, Maricao, Naguabo, Orocovis, Ponce, Quebradillas, Río Grande, San Lorenzo, and Utuado. Of wide occurrence.

Jayuya: *Odontosoria aculeata* (L.) J. Smith. Record voucher: Puerto Rico, Municipio de Jayuya, growing in a notch of a tree that was growing along the side of Rt. 143 near Km marker 9.8, at an elevation of 786 m, N 18° 09' 03.7" W 66° 37' 59.0". Collected 18 May 2006 by S.W. Shaw, M.S. Barker # 448, and S.V. Sprunt. Previously known Puerto Rico distribution: Aguas Buenas, Barranquitas, Bayamón, Caguas, Cayey, Fajardo, Manatí, Maricao, Naguabo, Naranjito, Patillas, Río Grande, Sabana Grande, San Germán, San Juan, Utuado, and Villalba. Very widespread in suitable habitat. ***Polypodium polypodioides*** (L.) Watt. Record voucher: Puerto Rico, Municipio de Jayuya, growing in debris in a rock cliff face along the north side of Rt. 143 at an

elevation of 924 m, N 18° 09' 41.3" W 66° 36' 50.2". Collected 18 May 2006 by S.W. Shaw, *M.S. Barker* # 444, and S.V. Sprunt. Previously known Puerto Rico distribution: Adjuntas, Aibonito, Arecibo, Barranquitas, Bayamón, Cayey, Ciales, Isabela, Juana Díaz, Maricao, Ponce, Sabana Grande, Vega Alta, Villalba, Yabucoa, and Yauco. Of wide occurrence. *Pteris vittata* L. Record voucher: Puerto Rico, Municipio de Jayuya, growing in debris in a rock cliff face along the north side of Rt. 143 at an elevation of 924 m, N 18° 09' 41.3" W 66° 36' 50.2". Collected 18 May 2006 by S.W. Shaw, *M.S. Barker* # 445, and S.V. Sprunt. Previously known Puerto Rico distribution: Camuy, Isabela, Ponce, San Juan, and Vega Alta. Very widespread but not often collected.

Maricao: *Arachniodes chaerophylloides* (Poir.) Proctor. Record voucher: Puerto Rico, Municipio de Maricao: Growing on the edge of Rt. 105, at an elevation of 350 m, N 18° 10' 37.3" W 67° 00' 58.0". Collected 22 May 2006 by S.W. Shaw, *M.S. Barker* # 484, and S.V. Sprunt. Previously known Puerto Rico distribution: Adjuntas, Aibonito, Arecibo, Barranquitas, Bayamón, Cayey, Comerío, Guayanilla, Isabela, Lares, Las Marias, Mayagüez, Naguabo, Naranjito, Patillas, Ponce, Quebradillas, San Juan, and Yabucoa. Of wide occurrence in the mountain areas.

Maunabo: *Microgramma lycopodioides* (L.) Copel. Record voucher: Puerto Rico, Municipio de Maunabo, growing on a tree near the edge of the roadway of Rt. 181, at an elevation of 487 m, N 18° 03' 46.9" W 65° 59' 28.7". Collected 21 May 2006 by S.W. Shaw, *M.S. Barker* # 472, and S.V. Sprunt. Previously known Puerto Rico distribution: Arecibo, Cayey, Dorado, Gurabo, Jayuya, Luquillo, Manatí, Maricao, Naguabo, Salinas, San Germán, Utuado, Yabucoa, and Yauco. Of wide occurrence throughout the island.

Morovis: *Adiantum tenerum* Sw. Record voucher: Puerto Rico, Municipio de Morovis, growing on a rock wall along the side of Rt. 160, at an elevation of 160 m, N 18° 20' 31.9" W 66° 22' 24.8". Collected 19 May 2006 by S.W. Shaw, *M.S. Barker* # 452, and S.V. Sprunt. Previously known Puerto Rico distribution: Adjuntas, Arecibo, Cabo Rojo, Ciales, Coamo, Guayanilla, Hatillo, Manatí, Orocovis, Peñuelas, Quebradillas, Toa Baja, Utuado, and Vega Alta. Of wide occurrence. *Tectaria heracleifolia* (Willd.) Underw. Record voucher: Puerto Rico, Municipio de Morovis, growing on limestone alongside a small stream next to Rt. 160 near Km marker 14.9, at an elevation of 160 m, N 18° 20' 31.9" W 66° 22' 24.8". Collected 19 May 2006 by S.W. Shaw, *M.S. Barker* # 450, and S.V. Sprunt. Previously known Puerto Rico distribution: Aguas Buenas, Arecibo, Cabo Rojo, Cayey, Corozal, Florida, Isabela, Peñuelas, Quebradillas, Toa Baja, Utuado, and Vega Alta. Wide spread in the western side of the island. *Thelypteris guadalupensis* (Wikstr.) Proctor. Record voucher: Puerto Rico, Municipio de Morovis, growing on limestone alongside a small stream next to Rt. 160 near Km marker 14.9, at an elevation of 160 m, N 18° 20' 31.9" W 66° 22' 24.8". Collected 19 May 2006 by S.W. Shaw, *M.S. Barker* # 451, and S.V. Sprunt. Previously known Puerto Rico distribution: Aguas Buenas, Arecibo, Barceloneta, Ciales, Corozal, Florida, Guayanilla, Guaynabo, Hatillo, Isabela, Lares, Manatí, Quebradillas, San Sebastián, Toa Baja, Utuado, and Vega Alta. Occurs in most areas where there is moist limestone. *Thelypteris*

kunthii (Desv.) C.V. Morton. Record voucher: Puerto Rico, Municipio de Morovis, growing on limestone alongside a small stream next to Rt. 160 near Km marker 14.9, at an elevation of 160 m, N 18° 20' 31.9" W 66° 22' 24.8". Collected 19 May 2006 by S.W. Shaw, *M.S. Barker* # 449, and S.V. Sprunt. Previously known Puerto Rico distribution: Aibonito, Arecibo, Bayamón, Cabo Rojo, Ciales, Coamo, Corozal, Guayanilla, Hatillo, Mayagüez, Quebradillas, San Sebastián, Toa Alta, Vega Alta, Vega Baja, and Yauco. Of wide occurrence.

Patillas: *Adiantum latifolium* Lam. Record voucher: Puerto Rico, Municipio de Patillas, growing on the bank of Lago Patillas near Rt. 181 at an elevation of 61 m, N 18° 01' 12.4" W 66° 00.0' 55.9". Collected 21 May 2006 by S.W. Shaw, *M.S. Barker* # 471, and S.V. Sprunt. Previously known Puerto Rico distribution: Arecibo, Coamo, Florida, Gurabo, Las Marias, Maricao, Mayagüez, Quebradillas, Río Grande, San Juan, Toa Baja, Vega Alta, and Yabucoa. Of wide occurrence.

Ponce: *Niphidium crassifolium* (L.) Lellinger. Record voucher: Puerto Rico, Municipio de Ponce, growing in debris on top of a rock cliff face along the south side of Rt. 143 at an elevation of 924 m, N 18° 09' 41.3" W 66° 36' 50.2". Collected 18 May 2006 by S.W. Shaw, *M.S. Barker* # 442, and S.V. Sprunt. Previously known Puerto Rico distribution: Adjuntas, Arecibo, Barranquitas, Cayey, Maricao, Naguabo, Río Grande, and Utuado. Widely occurring in the Sierra de Luquillo, Sierra de Cayey, Cordillera Central, and Río Abajo State forest. ***Campyloneurum latum* T. Moore.** Record voucher: Puerto Rico, Municipio de Ponce, growing in debris on top of a rock cliff face along the south side of Rt. 143 at an elevation of 924 m, N 18° 09' 41.3" W 66° 36' 50.2". Collected 18 May 2006 by S.W. Shaw, *M.S. Barker*, and S.V. Sprunt # 177. Previously known Puerto Rico distribution: Arecibo, Cabo Rojo, Cayey, Hatillo, Isabela, Juana Díaz, Lares, Naranjito, Quebradillas, San Lorenzo, Toa Baja, Vega Alta, and Yabucoa. It is of wide occurrence.

San Juan: *Gleichenia bifida* (Willd.) Spreng. Record voucher: Puerto Rico, Municipio de San Juan, growing along the side of the road of Rt. 1 near Km 48 on an exposed dirt bank at an elevation of 427 m, N 18° 23' 10.0" W 66° 05.0' 27.0". Collected 21 May 2006 by S.W. Shaw, *M.S. Barker* # 469, and S.V. Sprunt. Previously known Puerto Rico distribution: Adjuntas, Barranquitas, Caguas, Cayey, Jayuya, Lares, Maricao, Mayagüez, Morovis, Naguabo, Orocovis, Ponce, Río Grande, San Germán, Utuado, and Yauco. Of wide occurrence especially in the mountain areas.

San Sebastian: *Anemia adiantifolia* (L.) Sw. Record voucher: Puerto Rico, Municipio de San Sebastian, growing in the shade alongside Rt. 119 near Km 20 at an elevation of 221 m, N 18° 23' 18.2" W 66° 55' 34.0". Collected 20 May 2006 by S.W. Shaw, *M.S. Barker* # 461, and S.V. Sprunt. Previously known Puerto Rico distribution: Aguadilla, Arecibo, Cayey, Ciales, Coamo, Comerío, Florida, Isabela, Lares, Manatí, Mayagüez, Peñuelas, Quebradillas, Rincón, Toa Alta, Utuado, Vega Alta, and Vega Baja. Of wide occurrence except in very wet and extremely dry areas.

Vega Baja: *Adiantum pyramidale* (L.) Willd. Record voucher: Puerto Rico, Municipio de Vega Baja, growing at the base of a tree that was growing

alongside Rt. 155 near Km marker 57.6, at an elevation of 158 m, N 18° 22' 39.6" W 66° 25' 26.2". Collected 19 May 2006 by S.W. Shaw, *M.S. Barker* # 453, and S.V. Sprunt. Previously known Puerto Rico distribution: Adjuntas, Aguas Buenas, Arecibo, Barranquitas, Bayamón, Cayey, Coamo, Guayanilla, Guaynabo, Gurabo, Isabela, Maricao, Mayagüez, Naranjito, Quebradillas, Toa Baja, Utuado, Vega Alta, Yabucoa, and Yauco. Of wide occurrence growing in lowlands and mountains areas in the western and central part of the island.

We thank R.J. Hickey for his assistance and the use of his lab, Puerto Rico department of Natural and Environmental Resources for collecting permits, the Willard Sherman Turrell Herbarium at Miami University (MU) for funding, and Ken Grabach for map assistance.—S. W. SHAW, Department of Botany, University of Hawaii at Manoa, Honolulu, HI 96822, sws@hawaii.edu, S. V. SPRUNT, Department of Botany, Miami University, Oxford, OH 45056, USA, and M. S. BARKER, Department of Biology, Indiana University, Bloomington, IN 47405, USA.

Two Exotic Ferns, *Dryopteris erythrosora* and *Marsilea quadrifolia*, Newly Naturalized in Arkansas.—Continued field work on the Arkansas flora has led to the discovery of two non-native species of ferns that have escaped from cultivation and become established as persistent plants in natural settings in Arkansas. Two years ago, John Simpson noticed a curious, single plant of *Dryopteris* on the edge of an old timber access road through the lower portion of his property in Hot Spring County, Arkansas. The property is located approximately seven miles southwest of Hot Springs in the Ouachita Mountain region of Arkansas. The fern persisted through two winters, grew to 8 fronds, was fertile, and did not quite fit the reported species known in Arkansas. During the fall 2007 Arkansas Native Plant Society annual meeting, the fern was presented as a “puzzle” plant to the members. The fern was examined by the authors and identified as *Dryopteris erythrosora* (D.C. Eaton) Kuntze, Autumn Fern, an Asian exotic and commonly cultivated log fern found in arboreta and ferneries in the southeastern United States. The lowland portion of the preserve is a *Quercus rubra* L. (Northern Red Oak) and *Carya alba* (L.) Nutt. ex Ell. (Mockernut) dominated forest with minor amounts of *Acer rubrum* L. (Red Maple) and *Liquidambar styraciflua* L. (Sweet Gum). A previous owner introduced *Pinus taeda* L. (Loblolly Pine) to the site as a timber crop. Those now mature pine trees are being harvested, returning the forest to its native canopy species composition. Other ferns present were *Asplenium platyneuron* (L.) Britton, Sterns, & Poggenberg, *Athyrium filix-femina* (L.) Roth ex Mert. var. *asplenioides* (Michx.) Farwell, *Botrychium biternatum* (Sav.) Underw., *Equisetum hyemale* L. *Osmunda cinnamomea* L., *Polystichum acrostichoides* (Michx.) Schott, *Pteridium*