
Parkia nana (Leguminosae, Mimosoideae), a New Species from the Sub-Andean Sandstone Cordilleras of Peru

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ABSTRACT. *Parkia nana* D. A. Neill (Leguminosae, Mimosoideae) from sandstone areas near the Río Marañón area in northeastern Peru is described and illustrated. Photographic evidence also indicates presence of this species on sandstone substrate in the Cordillera Azul in east-central Peru. Compared to other species of *Parkia* R. Brown, which commonly attain 30–40 m in height, *P. nana* has a dwarf growth form, found as a pachycaul treelet attaining reproductive maturity at 3–4 m in height. The new species is placed in the pantropical section *Parkia* R. Brown and is similar to *P. nitida* Miquel and *P. balslevii* H. C. Hopkins, with which it shares the opposite to subopposite leaves, the biglobose capitula, and indehiscent strap-shaped pods, but differs from both in its short stature, erect compound inflorescence, and erect, velutinous fruits.

RESUMEN. Se describe y se ilustra *Parkia nana* D. A. Neill (Leguminosae, Mimosoideae) procedente de mesetas de arenisca cerca al Río Marañón en el nororiente del Perú. Evidencia fotográfica además indica la presencia de esta especie en substrato de arenisca en la Cordillera Azul en el centro-oriente del Perú. A diferencia con otras especies de *Parkia* R. Brown, que frecuentemente alcanzan 30–40 m de alto, *P. nana* tiene una forma de crecimiento enana, es un arbolito poco ramificado que llega a la madurez reproductiva a la estatura de 3–4 m. La especie nueva se ubica en la sección *Parkia* R. Brown, que tiene una distribución pantropical, y es similar a *P. nitida* Miquel y *P. balslevii* H. C. Hopkins, especies con las cuales comparte las hojas opuestas a subopuestas, las cabezuelas biglobosas, y las vainas indehiscentes y planas, pero con las cuales difiere en su estatura baja, su inflorescencia compuesta erecta, y sus frutos erectos y vellosos.

Key words: IUCN Red List, Leguminosae, Mimosoideae, *Parkia*, Peru, sandstone.

The genus *Parkia* R. Brown, comprising some 35 species of trees, has a broad pantropical distribution with three disjunct centers of diversity including the Neotropics (centered in lowland Amazonia), Africa–

Madagascar, and tropical Asia–Oceania (Lewis et al., 2005). Of the three sections of *Parkia*, only the largest, section *Parkia* R. Brown, is pantropical, including all of the 16 Paleotropical species and more than half of the 19 or more Neotropical species; sections *Sphaeroparkia* Ducke and *Platyparkia* Ducke are exclusively Neotropical and restricted to the Amazon region (Hopkins, 1986, 2000a, b, 2001).

In *Parkia* the individual flowers are tightly massed into globose, pyriform, or biglobose heads, known as capitula, and these partial inflorescences are grouped into branched compound inflorescences. In section *Parkia* there are three types of flower in each capitulum: (1) fertile flowers at the globose, swollen apex of the receptacle, (2) nectar-secreting flowers in the middle, in a ring below the fertile ones, and (3) staminodial flowers at the base. The compound inflorescences are generally borne outside of the leaf-crown, either above the crown and erect or below the crown and pendent. Species of *Parkia* are pollinated by bats in the Neotropics and Paleotropics (Baker & Harris, 1957; Baker, 1973; Hopkins, 1984), and the floral and inflorescence structures are considered to be adaptations to chiropterophily (but the three Amazonian species of section *Sphaeroparkia* are partially or entirely entomophilous; Hopkins, 1986).

Most species of *Parkia* throughout the pantropical range of the genus are large trees that attain 30 m or more in height in the canopy, or even taller emergents above the canopy, in lowland tropical forests. A few species that grow in reduced-stature vegetation types on nutrient-poor soils are much smaller trees. *Parkia cachimboensis* H. C. Hopkins is a small tree or shrub that attains just 5 m in height and grows exclusively in nutrient-deficient, highly acidic sand or sandstone, in low scrubby vegetation known as white-sand campina or Amazon caatinga (Anderson, 1981) in the Tapajós region of Pará, Brazil (Hopkins, 1986). Similarly, *P. lutea* H. C. Hopkins (Hopkins, 2000a) is a small tree 5–10 m tall, occurring on lowland white-sand campina in central Amazonia (Amazonas, Brazil, near the mouth of the Río Madeira). A third species of *Parkia* that grows as a small tree is *P. barnebyana* H.

C. Hopkins (Hopkins, 2000b, 2001) from the upper Río Negro region of the Venezuelan Guayana. The label information indicates that *P. barnebyana* attains just 7–9 m in height, and like *P. cachimboensis* and *P. lutea*, it may be endemic to lowland white-sand scrub, but the soil type is not indicated on the specimen labels of the two known collections.

Recent collections from the sub-Andean sandstone plateaus in the Río Marañón region of Amazonas Department, Peru, have revealed a fourth dwarf species of *Parkia*, in section *Parkia*, that is evidently restricted to the nutrient-poor sandstone substrate and has a limited distribution in this habitat type in westernmost Amazonia.

Parkia nana D. A. Neill, sp. nov. TYPE: Peru. Amazonas: Bagua District, Imaza, Tayu Mujaji, Comunidad Nativa de Wawas, bosque primario, vegetación de 2 m de alto promedio (Uwejush), 1100 m, 05°15'S, 78°02'W, 7 Feb. 1999 (fl., immature fr.), R. Vásquez, C. Vargas, J. Yactayo & E. Palomino 26063 (holotype, USM 181801; isotypes, MO 5593805, MO 5593806). Figure 1.

Haec species *Parkiae nitidae* Miquel et *P. balslevii* H. C. Hopkins foliis oppositis vel suboppositis, inflorescentiis biglobosis et legumine ligulato indehiscente similis, sed ab eis habitu humiliore (arboris parvae 3–4 m altae), inflorescentiis erectis et fructibus velutinis recedit.

Small tree or shrub, sparsely branched, with erect or ascending branches, 3–4 m tall; branchlets, petiole, and rachises with brownish ferruginous pubescence of short simple hairs. Leaves bipinnate, opposite or subopposite, (9–)11–15 cm, with swollen basal pulvinus; petiole 2.5–3.5 cm; rachis 5–9 cm; petiole bearing a single shallow, inconspicuous elliptic gland, ca. 3 × 1.5 mm, on abaxial side, ca. halfway from the base to the first pair of pinnae; pinnae 8 to 10 in pairs, opposite to subopposite; leaflets 16 to 28 pairs per pinna, oblong, 2–6 × ca. 1 mm, the length of the leaflets gradually diminishing at the distal end of the pinna to a minimum of 2 mm long at the distal end versus ca. 6 mm in the central and basal portions of the pinna; apex of leaflet rounded, the base auriculate on the proximal side; main nerve of leaflet central and straight at apex. Compound inflorescence axis erect, projecting above foliage, ca. 10–12 cm long; peduncles in 3 or 4 pairs, opposite and decussate along erect compound inflorescence axis, ascending at an angle, ca. 4–6 cm long; capitula yellow, ca. 3–4(–5) cm, biglobose, the basal fringe of staminodial flowers ca. 3.5–4 cm diam., the apical portion ellipsoid, ca. 2–2.5 cm diam. Hermaphrodite (apical) flowers: calyx ca. 4 mm, the 5 lobes ca. 0.5 mm long, minutely pubescent; corolla ca. 5–5.5 mm, the 5 lobes ca. 0.5 mm long, minutely

pubescent; the 10 stamens exerted ca. 10 mm beyond corolla. Nectar-secreting (midportion) flowers similar in size to hermaphroditic flowers. Staminodial (basal) flowers: calyx ca. 6 mm, with rounded lobes ca. 1 mm long, minutely pubescent; corolla ca. 9–10 mm, lobes ca. 1–1.5 mm long, filaments exerted to ca. 18–20 mm beyond corolla. Immature pods strap-shaped, with dense ferruginous to brownish velutinous pubescence; mature pods (seen only in photographs; no specimens available) borne erect or ascending on erect compound inflorescence, above foliage, indehiscent, estimated to be ca. 12–20 × 3–4 cm, with ferruginous to brownish velutinous pubescence evident in photographs. Seeds elliptic, glossy black, seen only in photographs.

Distribution and habitat. Herbarium specimens of *Parkia nana* have been obtained only from a small area in the Bagua District, Amazonas Province, Peru, in territory owned by indigenous Aguaruna communities in the vicinity of the settlement of Imaza. This area is a few kilometers east of the Río Marañón where the river flows through a region of sandstone outcrops above the river valley, near the union of the Marañón and one of its right bank tributaries, the Río Imaza (or Río Chiriaco), at about 05°15'S, 78°22'W. Both of the known collections were made from low shrubby vegetation atop sandstone plateaus or ridges, at 900–1100 m in elevation.

Photographic evidence and site records, however, suggest that *Parkia nana* also occurs on sub-Andean sandstone mountains about 350 km farther to the south of the type locality, in east-central Peru. Biologists, including botanists from the herbaria of the Field Museum of Chicago (F) and the Universidad Nacional Mayor de San Marcos in Lima (USM), carried out a “Rapid Biological Inventory” of the Cordillera Azul National Park along the boundary between San Martín and Loreto departments, between the Ucayali and Huallaga rivers (Alverson et al., 2001). On the high sandstone ridges of the Cordillera Azul, at 1400 m elevation, about 07°34'S, 75°31'W, Robin Foster photographed a small *Parkia* about 3 m tall with opposite leaves and erect, evidently velutinous brown fruits and black seeds. Taking note of those features, he wrote in the expedition report (Alverson et al., 2001) that the dwarf *Parkia* was a new species distinguished by its small stature and erect fruits. Herbarium specimens were not collected on the F/USM Cordillera Azul expedition, but the photographs were posted on the Internet site of the Field Museum, <www.fmn.org/plantguides>. I believe the images of the dwarf *Parkia* from the Cordillera Azul almost certainly represent another population of *P. nana*. There are a number of

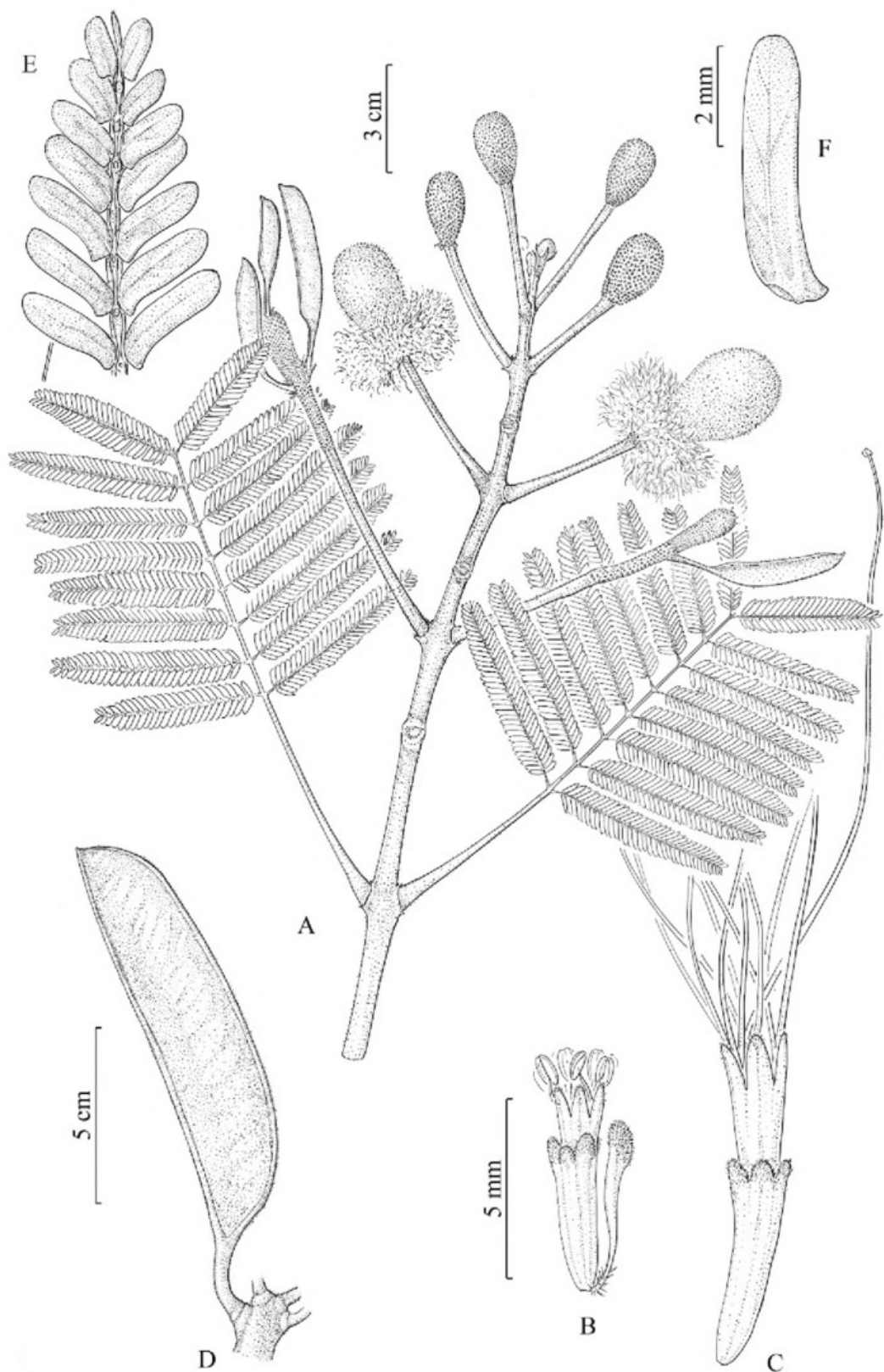


Figure 1. *Parkia nana* D. A. Neill. —A. Branchlet with a terminal, compound inflorescence and young fruits. —B. Fertile flower from the apical portion of the capitulum. —C. Staminal flower from the basal portion of the capitulum. Scale bar for B also applies to C. —D. Nearly mature fruit. —E. Distal end of pinna with leaflets. (Detail from part A.) —F. Leaflet. A–C and E–F drawn from the type and paratype, *R. Vásquez et al.* 26063 and *R. Vásquez* 27597 (MO); D from photographs taken by Robin Foster of a tree in the Cordillera Azul, Loreto Department, Peru, and posted on the Internet at <www.fnmh.org/plantguides>.

sandstone outcrops in eastern Peru, most of which have not been explored at all botanically, where this species is also likely to occur; in addition, it is likely to occur on the lower elevation sandstone ridges of the Cordillera del Cóndor in southeastern Ecuador (Neill, 2005), where *P. nana* has not been found as yet.

Ecologically, *Parkia nana* appears to be restricted to the low scrub vegetation or dwarf forest that occurs exclusively on sandstone outcrops in sub-Andean cordilleras below 1500 m elevation, at the extreme western edge of the Amazon Basin in Peru. These sandstone outcrops form an “archipelago” of isolated, edaphically distinct habitat islands that vary from a few hectares in size to tens of thousands of hectares. The floras of very few of these sandstone cordilleras have been inventoried as yet, and none have been explored thoroughly, but ongoing studies in Ecuador and Peru have revealed that many trees and shrubs in the sandstone dwarf forests are restricted to that habitat; some are local endemics (Neill, 2005) and some are more widespread in the lowland white-sand campinas or “Amazon caatingas” that are scattered throughout the Amazon Basin (Anderson, 1981).

IUCN Red List category. *Parkia nana* is known with certainty from a single locality that is not formally protected, and the presumed record of a protected population in Cordillera Azul National Park is based only on photographic evidence. This species is believed to be ecologically restricted to sandstone substrates, which are scattered as isolated habitat islands in the sub-Andean cordilleras of eastern Peru. The population size, extent of occurrence, and area of occupancy of *P. nana*, criteria used in the IUCN Red List categories for threatened species (IUCN, 2001), are not known to any degree of precision. In general, the natural vegetation on these isolated sandstone outcrops in Peru and Ecuador is not highly threatened at present because these sites are relatively difficult to access, are not suitable for agriculture, and are usually not subject to deforestation by rural inhabitants in this region. However, because the total population of this species is expected to be relatively small, fragmented, and ecologically restricted, migration to other areas under future conditions of climate change may not be possible, and increased alteration of forest habitats in eastern Peru by agriculture, mining, or other human activities may take place in the future, the IUCN Red List category of Near Threatened (NT) is assigned to this species. *Parkia nana* is clearly not, by any measure, widespread and abundant, which are criteria for the IUCN category of Least Concern (LC).

Etymology. The specific epithet, Latin meaning “dwarf,” refers to the unusually small stature of *Parkia nana*, in comparison with most other species of *Parkia*, which are tall canopy emergent trees.

Discussion. Within section *Parkia*, *P. nana* is most similar to the widespread *P. nitida* and *P. balslevii*, known only from Amazonian Ecuador. Both of the latter species share several features with *P. nana*, including the opposite to subopposite leaves, biglobose capitula, and strap-shaped indehiscent pods. *Parkia nitida* and *P. balslevii*, however, are large canopy emergent trees attaining 30–40 m in height, and the compound inflorescences in both species are pendent, hanging below the leafy crown of the tree, with the capitula pendent from long peduncles. The capitula of *P. nana* are yellow like those of *P. nitida*, whereas those of *P. balslevii* are pinkish red. The strap-shaped indehiscent pods of all three species are similar, but those of *P. nitida* and *P. balslevii* are glabrous, whereas those of *P. nana* bear a velutinous pubescence similar to the pods of the more distantly related *P. velutina* Benoist, in section *Sphaeroparkia*, which is widespread in lowland Amazonia.

Paratype. PERU. Amazonas: Bagua Distr., Imaza, Tayu Mujaji, bosque primario, 05°15'56"S, 78°22'07"W, 900–1030 m, 17 Feb. 2002, R. Vásquez 27597 (fl., imm. fr.), (MO, USM not seen).

Both the type and the paratype were originally determined by the author as *Parkia nitida* Miquel, and duplicates under that name may have been distributed from MO to other herbaria.

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