

tion is no doubt a close approximation to the actual mineral composition. The composition of the norm is given for comparison.

Mode and norm of nepheline basalt from about 24 miles east of Blackfoot, Idaho

	<i>Mode</i>	<i>Norm</i>	<i>Difference</i>
Apatite.....	1	1	0
Ilmenite.....	1	1	0
Magnetite.....	3	5	2
Biotite.....	8		-8
Forsterite.....	26	31	5
Diopside.....	39	25	-14
Nepheline.....	20	11	-9
Orthoclase.....		9	9
Albite.....		6	6
Anorthite.....		9	9
H ₂ O.....	2	2	0
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Total.....	100	100	

The comparison of the norm and the mode thus indicates that the norm shows more magnetite, forsterite, and feldspar than the mode and less biotite, diopside, and nepheline.

BOTANY.—*Some new caesalpinaceous trees of Panama.* HENRY
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The botanical exploration of the Isthmus of Panama begun under the auspices of the Smithsonian Institution in 1910, and since continued occasionally, has brought to light startling facts with reference to the occurrence of certain genera hitherto unknown within that region. It has been known for a long time that Middle America is mainly a territory of transition between the floras of two continents, in which many genera have their northernmost or southernmost limit, the proportion of either South American or North American species respectively decreasing or increasing according to the distance from their centers of dispersion. But there was no indication whatever of the very sudden change which takes place in Darien, the eastern part of Panama and the connecting link with South America.

This abrupt transition brings in as new elements of the flora several genera known heretofore as represented exclusively in the Amazonian Hylea or in the eastern part of South America. The presence of these species in a district separated from regions of identical climatic conditions both by imposing mountain ranges and the semixerophytic belt of Colombia and Venezuela constitutes a most interesting problem, the solution of which may not be reached until the interlocking slopes and valleys of Colombia and Venezuela have been thoroughly explored. Among such Panamanian representatives of Brazilian genera one species each of *Stachyarrhena*, *Cassupa*, *Browneopsis*, and *Colignonia* has already been detected, while many others are certain to appear during the further progress of the work of identifying and naming the extensive collections now at hand. In the present paper, 3 more species, belonging to 2 genera, are described under the names *Peltogyne purpurea*, *Centrolobium yavizanum*, and *Centrolobium patinense*. Furthermore, an undescribed species of *Dilodendron* has been collected in the hilly region of the Chucunaque Valley, while the forests of Darien in general have furnished an unusually strong contingent of *Lecythidaceae*, among them 1 species of *Couroupita*, 4 of *Lecythis*, 3 of *Eschweilera*, and 2 of *Gustavia*.

Another interesting fact never brought out before is the considerable development, along the Pacific coast, of the mangrove formation, and the presence in the inner part of the tidal-belt of a characteristic tree allied to the *mora* of Guiana and never described. Besides being of importance as an ecologic element, this species enjoys the peculiarity of possessing the largest known dicotyledonous seed. It also is described below under the name *Dimorphandra megistosperma*.

Centrolobium yavizanum Pittier, sp. nov., ramulis juvenibus folisque pube molli ferruginea evanescente dense vestitis, petiolis communibus teretibus, longitudinaliter striatis, stipulis ovatis, obtusis, extus dense villosolanas, intus pubescentibus, foliis membranaceis, breviter petiolulatis, ovatis vel elliptico-lanceolatis, argute acuminatis, basi rotundatis, leviter emarginatis, supra glabrescentibus, infra glabratis, ad costas venasque rufo-villosis; floribus . . . ; legumine primum glanduloso-tomentello dein glabrato, aculeis partis seminiferæ

densis, acicularibus, stili vestigio adscendente, apice recurvato, ala cultriformi, apice rotundata, venis a basi alae adscendentibus, demum a latere stilifero arcuatis.

Arbor decidua, 25–30 metralis, cortice griseo, coma elongata. Petiolus communis 30–50 cm. longus, e basi attenuatus; petioluli circa 3 mm. longi, folioli 13–17, 6.5–12 cm. longi, 4–5.5 cm. lati, jugis inferioribus latioribus brevioribusve, intermediis longioribus. Pedicelli floriferi 7–8 mm. longi, puberuli, bracteolis angustis, 3 mm. longis, persistentibus; calyx glandulosus, ferreo-puberulus, persistens, lobulis obtusis; ovarium stipitatum. Pedicellus fructifer 1 cm. longus, calycem incrassatum sustinens; legumen cum ala 12–14 cm. longum, 4–5 cm. latum, e stipite 2 cm. longo aculeato suffultum, aculeis circa 1.8 cm. longis.

Type in U. S. National Herbarium, no. 716,636.

PANAMA: In virgin forest between Pinogana and Yaviza, southern Darien, leaves and fruits only, April 22, 1914 (*Pittier* 6572, type).

Centrolobium patinense Pittier, sp. nov., ramulis juvenibus petiolisque pube molli fulva vel obscure purpurea dense vestitis, petiolis communibus teretibus, longitudinaliter striatis, stipulis late ovatis, subobtusis, lanatis, foliolis membranaceis, breviter petiolulatis, ovatis, abrupte acuminatis, basi rotundatis nunc emarginatis, ad costas venasque sparse rufo-villosulis, supra pubescentibus, infra glabratis, floribus; legumine juveni glanduloso, rufo-tomentello, demum glabrato, aculeis partis seminiferae densis, acicularibus, stili vestigio adscendente, recto, ala flabelliformi, apice oblique truncata, venis a basi alae adscendentibus dein a latere stilifero arcuatis.

Arbor decidua, 30 m. et ultra alta, cortice griseo, ligno duro, rubrospadiceo, coma elongata. Petiolus communis 30–35 cm. longus; folioli 11–15, 3–12 cm. longi, 2.5–7 cm. lati, jugis intermediis majoribus; petioluli 4 mm. longi. Pedicellus fructifer 1.5 cm. longus; calyx persistens, incrassatus; stipes dense rufo-hirsutus, aculeatus, 1.4 cm. longus; legumen cum ala 17–20 cm. longum, 6–8 cm. latum, aculeis usque ad 3 cm. longis.

Type in U. S. National Herbarium, no. 716,677.

PANAMA: Forest on dry hills at Punta Patiño, southern Darien, leaves and fruits only, June, 1914 (*Pittier* 6611, type).

These two species of a genus hitherto considered as exclusively Brazilian were one of the surprises of my last expedition to Darien. Besides having the characteristically shaped fruit of *Centrolobium*, they show minor details as to the numerous minute, resinous glands covering the leaves, young shoots, parts of the inflorescence, and the fruits in their first stage of maturity. In shape the fruit of *C. yavizanum* reminds one of that of *C. robustum* Mart., but in size it comes between the two varieties of this latter species and its veins are more strongly arcuate than in either of the two.

In size the fruit of *C. patinense* equals and even surpasses that of *C. robustum macrochaete*, but the form of the wing is quite distinct, its apex being cut in a distinct line almost parallel to the opposite margin. From the other Brazilian species the difference is greater still, so that there can be no doubt as to these Panamanian forms being specifically distinct.

Centrolobium yavizanum and *C. patinense* differ from each other in their leaflets, these more numerous on the average, more elongated, and emarginate at the base in the former, less numerous, shorter and broader, and simply rounded at the base in the latter. The petiolules also are sensibly shorter in the first species, which has comparatively smaller fruits, the wing rounded at the tip like a table knife, and not obliquely truncate as in the latter. The flowers of both species are unknown, the few details included in the description of *C. yavizanum* having been obtained from remnants collected along with the fruits.

Centrolobium patinense is known among the natives of Panama under the name of *amarillo de Guayaquil*, and is reputed as a cabinet wood on account of its hard, fine-grained wood, beautifully veined in several shades of red.

Peltogyne purpurea Pittier, sp. nov., ramis teretibus cortice grisea, ramulis gracilibus, violaceis; foliis deciduis, glaberrimis, stipulis semi-ovatis, acuminatis, membranaceis, caducissimis; foliolis unijugis, breve petiolulatis, falcatis, acuminatis, inaequilateralibus, basi oblique rotundatis, stipellis filiformibus, caducissimis; inflorescentia racemosa, pauciflora, floribus; legumine 1-spermo, pedicellato, semiorbiculato, glaberrimo, suturis angustissimis, laevibus, superiore arcuata, apice mucronulata, inferiore recta, longitudinaliter 1-sulcata; semine oblique ovato, depresso, funiculo in arillum anguste cupuliformem dilatato.

Arbor magna, duramine durissimo, purpureo, cortice griseo, ramulis foliisque glaberrimis. Stipulae 10 mm. longae, 6 mm. latae, stipellae 6-8 mm. longae. Petiolus 1.2-1.7 cm. longus, petioluli 3-4 mm. longi, lamina 5.5-6.5 cm. longa, 2.5-3 cm. lata, eleganter reticulato-venosa. Legumen 3 cm. longum, 1.6 cm. latum, pedicello 7 mm. longo. Semen 1.9 cm. longum, 1.1 cm. latum, "e legumine aperto ejectum diu tamen ei adhaerens."

Type in U. S. National Herbarium, no. 716,675.

PANAMA: On rocky hills along the Chucunaque River beyond Yaviza, southern Darien, young leaves only, April 22, 1914 (*Pittier* 6586); Punta Patiño, southern Darien, on hills along the seashore, leaves and mature pods (*Pittier* 6610.); also noticed by me in the dry forests around La Palma del Darien, and reported from Coiba Island.

Peltogyne purpurea, called *nazareno* or *moradó* by the natives of Panama, is one of the most remarkable trees of the forest in the districts with a well defined dry period. It grows preferably on ridges free of higher vegetation. The height of a full grown tree is seldom less than 25 meters and the trunk reaches up to 60 cm. in diameter. The tree is evidently deciduous, as only very young leaves, with the stipules still attached, were found near Yaviza. But at Punta Patiño, a few days later, there were individuals with the old leaves and pods still on, and others with young shoots and leaves only.

One of the peculiarities of the morado tree is that the seed remains hanging from the dehiscent pod by the hilum after maturity, probably until the rainy season sets in. This curious habit, which has been observed also in *Peltogyne congestiflora* Benth., of Brazil, may be considered as a means of protection against ants and other insects, or the extreme dryness of the soil. On the tree, however, the seeds are not immune from attacks, as I found many of them inhabited by a coleopterous insect.

The wood of *Peltogyne* is very hard, the sapwood white and little developed, and the heartwood of a beautiful purple color.

Dimorphandra megistosperma Pittier, sp. nov., ramis teretibus, verruculosis, brunneis, glabris; foliis exstipulatis, glaberrimis, petiolo communi infra foliola inferiora anguloso, superne plano, subtus tereti; foliolis bijugis, oppositis, coriaceis, breve petiolulatis, oblongo-acuminatis, basi plus minusve inaequilateralibus, apice obtusis, supra nitidis, infra glaucis; floribus sessilibus, densissime spicatis, spicis terminalibus vel subterminalibus; calyce glabro, lobulis rotundatis, ciliatis; petalis oblongis, calyce subduplo longioribus, basi attenuatis, apice rotundatis plus minusve irregulariter emarginatis, margine scarioso ciliato; staminibus fertilibus corolla longioribus, filamentis crassis, leviter attenuatis, antheris apicem antice lanoso-barbatis, demum glabrescentibus; pistillo staminibus subaequante, stipitato, ovario 3-ovulato, dense lanoso, stylo glabro; legumine 1-spermo, glabro, coriaceo, dehiscente; semine maximo, extus brunneo, nitido.

Arbor excelsa, 15-45 m. alta, trunco erecto 10-15 m. longo, usque ad 1 m. diametro, cortice nigrescente, coma elongata. Rhachis foliorum 5-9.5 cm. longa, parte infra foliola inferiora 2.5-5 cm.; petioluli 3-4 mm. longi, incrassati; foliola 10-18 cm. longa, 4.5-7 cm. lata, reticulato-venosa. Spicae floriferae 8-10 cm. longae; calycis lobi inaequales, 3.5-4 mm. longi; petala alba, 6 mm. longa, 2.5-3 mm. lata; stamina et staminodia 7-8 mm. longa. Legumen usque ad 25 cm. longum, 13 cm. latum, leviter depressum. Semen phaseoliforme, usque ad 18 cm. longum, 12 cm. latum.

Type in U. S. National Herbarium, no. 716,658.

PANAMA: In groves, in the tidal forest along the Mamoní River, near its confluence with the Bayano River, Province of Panama, pods and leaves, October 23, 1911 (*Pittier* 4582); below Sumacate, along the Tuyra River, southern Darien, flowers, April 25, 1914 (*Pittier* 6593, type). This species was observed also along the Sta. Lucia River in eastern Chiriquí; around La Palma del Darien, on the margin of the mangrove forest; and along the lower course of the Sambú River, also in southern Darien.¹

In the course of my exploration of Panama I had repeated opportunities to collect on the beaches of the Pacific and its tributary tidal rivers stray specimens of the enormous seed of the above described tree. Dr. M. A. Howe, of the New York Botanical Garden, had also gathered specimens of the same in the course of his explorations in 1910. The unusual size of this seed made me very anxious to know more about it from my own experience, especially since all queries among European and American botanists failed to procure further enlightenment about it. Finally, the tree producing these beans was discovered, on October 23, 1911, on a point of land at the meeting of the Mamoní and Bayano rivers, below Chepo, in the Province of Panama. Later on it was found again in Chiriquí and Darien, always playing an important rôle as a constituent of the forest of the tidal belt. But my discovery was only partial at that time, because I left the Isthmus without having been able to collect flowering specimens. It was not until April, 1914, that I had the privilege of seeing the *alcornoque*, as it is called by the natives, in full bloom in mile-long stretches along the lower course of the Tuyra River in southern Darien.

The *alcornoque* is a gregarious tree, seldom found as isolated individuals. With reference to the root system, there seems to be a great variety in the size of the buttresses and the way they part from the base of the trunk. At times they form large wings, generally three in number, reaching up the latter to a distance of 1.5 meters and over; at other times they are low and hardly noticeable. The main roots run horizontally on the surface of the ground and can often be followed

¹ In the Kew Herbarium there are specimens of a Panamanian tree, cited as *Dimorphandra oleifera* Triana in Hemsley's botanical part of the *Biologia Centrali-Americana* (1: 342). This species, collected by Sutton Hayes in the swamps of the Río Grande near Panama, has never been described. Through the courtesy of the Director of the Kew Gardens, I am informed that the species is "quite distinct from any species of *Dimorphandra* (Mora) represented here." In the absence of further data, however, and in order to avoid a possible confusion, I deem it preferable to describe under a new name the material collected by myself.

to a distance of some 15 meters from the trunk; they are flattened laterally and end in several secondary branches, each of which lies on the flat bottom, forming a succession of bow-like arches, with numerous rootlets growing downward at the lowest points. Around the base of the tree, in parts temporarily submerged, there appear sometimes bunches of thin roots, which are supposed to be pneumatophores.

The trunk is usually straight with a smooth, dark brownish, peeling bark. It will give logs of 6 to 8 meters, of any diameter up to 1 meter, of a pale brown, tough, close grained wood. The sap once excluded, this wood is, it is claimed, incorruptible and adapted as a substitute for oak or other hard timbers in their various industrial uses. According to another statement the wood of the alcornoque is better than any other for structures kept permanently under sea water.

The crown of the tree is elongated and the main limbs are rather short. The middle-sized specimen which was felled to procure herbarium material was 31 meters high; the trunk measured 10 meters in length and 75 cm. in diameter; the white sapwood had a thickness of 5 to 7 cm.; and the heart was dark reddish.

Botanically speaking the affinities of *Dimorphandra megistosperma* are with *D. excelsa* (Schaub.) Baillon, of British Guiana. Its leaves, however, are pinnate, with only 2 pairs of leaflets, instead of the 3 or 4 pairs of the latter. The floral spikelets are not paniculate but solitary at the end or in the upper axils of the branchlets. In the several ovaries which were dissected a constant number of ovules was found, 3, of which only one reaches maturity. The enormous pods, once ripe, open with a twist of the valves without parting from the branchlets, and the seed slips to the muddy ground, where germination starts almost immediately. From the cotyledons the natives extract by infusion a dark red dye.

The dimensions of the pods and seeds are variable. As reported in the description, the largest specimen found measured 18 cm. in length with a breadth of 12 cm. and a thickness of 8 cm.