Three New Palm Genera from Indonesia

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This paper is an illustrated introduction to three recently-described palm genera from Indonesia.

The past few years have seen a surge in the recognition of new palm genera. Some, like *Tahina* from Madagascar and *Sabinaria* from Colombia, were the results of new exploration yielding palms never before seen by botanists. Others, such as *Dransfieldia*, *Lanonia*, *Leucothrinax* and *Saribus*, were hiding in plain sight, masquerading as other genera, their new identities first revealed by DNA sequencing. The three recently-described Indonesian genera (Heatubun et al. 2014a) came to light as a result of both new exploration *and* molecular analyses. All three genera are monotypic and belong to the subtribe Ptychospermatinae, which includes important ornamental genera such as *Ptychosperma*, *Veitchia* and *Wodyetia*.

Two of the three genera were discovered in the course of work toward a comprehensive account of the palms of New Guinea (PoNG). The PoNG project, led from Kew but involving collaborators from many institutions, has instigated field work in New Guinea, focusing on areas not previously visited by botanists and has brought about the discovery and description of dozens of new species. Nevertheless, the discovery of two new palm genera in the offshore islands at the western end of New Guinea, and another new genus in nearby Halmahera (Fig. 1), in the span of just a few years was surprising and unprecedented.

The first herbarium specimens of the new genera, named *Jailoloa*, *Manjekia* and *Wallaceodoxa*, were collected in 2011, 1998 and 2006 respectively. All were easily assigned to subtribe Ptychospermatinae on the basis of their jagged (praemorse) leaflets and bullet-

shaped male flower buds with numerous stamens, but none of them conformed strictly to any accepted genus. It was not until French PhD student Elodie Alapetite completed an in-depth molecular analysis of the subtribe that persuasive evidence was obtained for the need for three new genera (Alapetite et al. 2014). In this work DNA sequence data from eight different gene markers were painstakingly assembled to produce a tree of relationships (phylogeny) among the members of Ptychospermatinae. The phylogeny provided much support for most well-known genera but highlighted the isolation of the three new genera plus *Adonidia* on two distinct branches, *Jailoloa* and *Manjekia* on one branch and *Adonidia* and *Wallaceodoxa* on the other. These taxa are not closely related to other Ptychospermatinae and are also morphologically distinct. Here we provide a summary of each new genus with photographic illustration of key features.

Jailoloa

Jailoloa is based upon *J. halmaherensis* (Fig. 2), a palm discovered by one of us (CH) on the island of Halmahera, in the North Moluccas (Fig. 1). It was discovered during the course of an environmental impact survey of a nickel mining area and was first described as a species of *Ptychosperma*, *P. halmaherense* (Heatubun 2011), based on its resemblance to that genus. The new generic name is taken from Jailolo (sometimes spelled Gilolo), the former indigenous name for Halmahera.

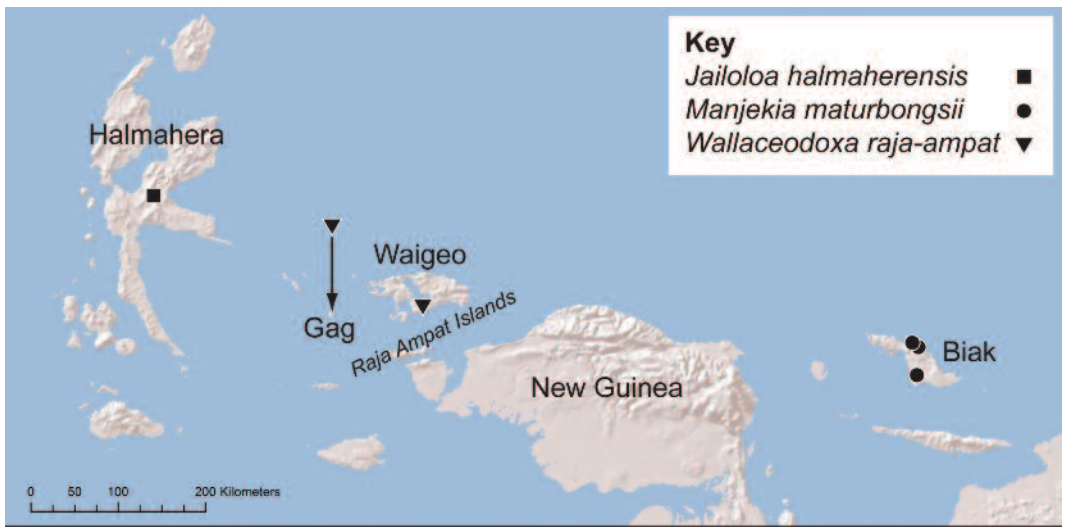
Jailoloa halmaherensis is unusual in the subtribe in that it is endemic to ultramafic soils, which are rich in heavy metals, including iron, magnesium and nickel. The metals in the soil are also found in the underlying rock, which is why many areas of ultramafic soil have been disturbed or even destroyed by mining. The plant life on ultramafic soils is often rich in endemic species, as the soil tends to be toxic to more common, generalist species. The only other ultramafic specialist in the Ptychospermatinae is believed to be *Veitchia lepidota* of the Solomon Islands.

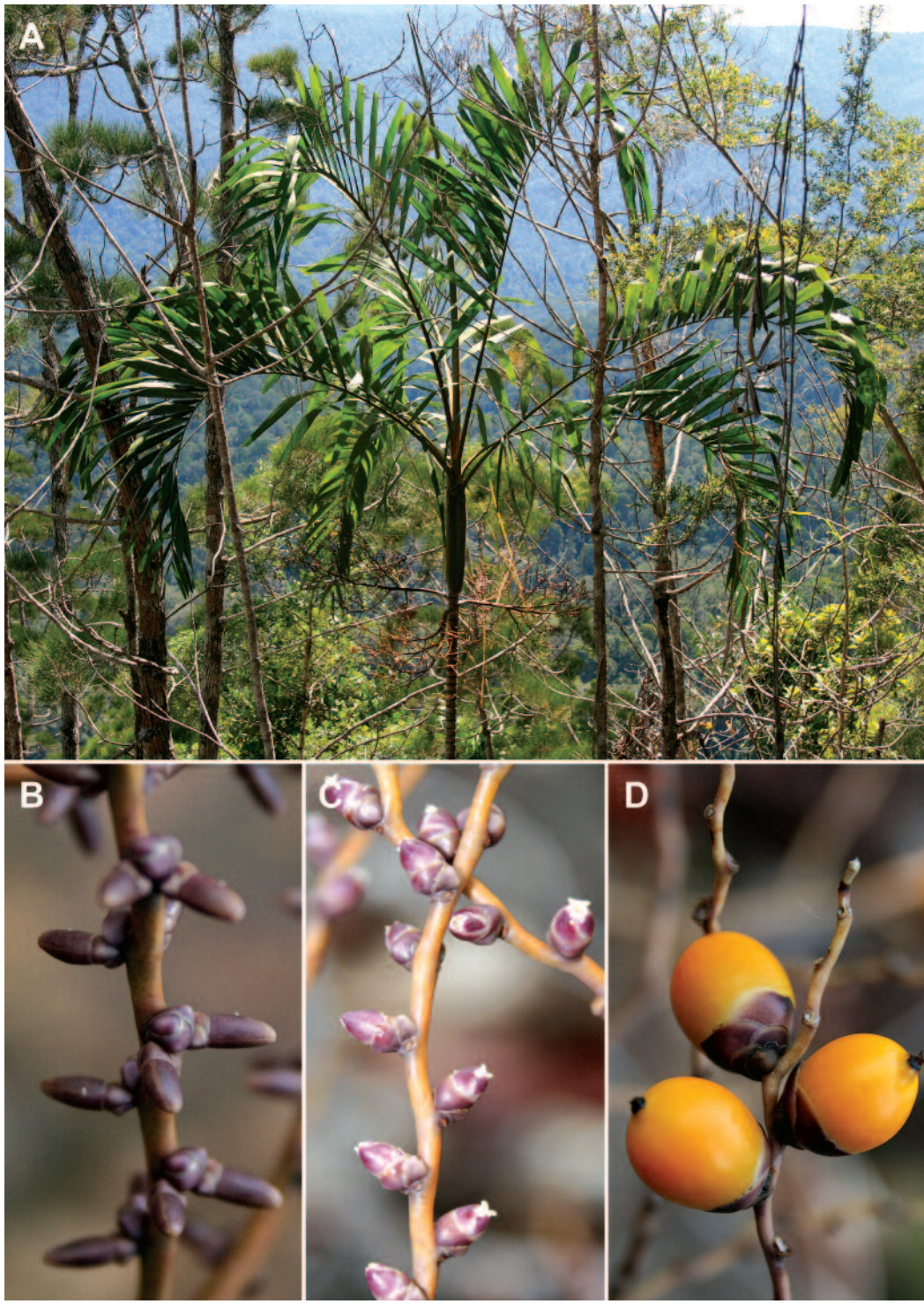
Jailoloa is a small, elegant palm with gracefully arching leaves and ascending, leathery leaflets. It has a single stem and a prominent crownshaft. The most distinctive features of the palm are the inflorescence axes and flowers, which are purple in color. The fruits are orange-yellow. The endocarp is terete (not ridged) and thin, with a mixture of thick and thin, straw-colored fibers, and the endosperm is ruminate. *Ptychosperma*, the most similar genus, typically has ridged endocarps and seeds and does not display ascending leaflets or the same combination of inflorescence and fruits colors.

Manjekia

Manjekia is based on *M. maturbongsii* (Fig. 3), which is endemic to Biak, a small island in Cenderawasih Bay, on the north coast of Indonesian New Guinea (Fig. 1). Rumor of this species, mistakenly thought to be a species of *Drymophloeus*, circulated in the early 1990s. It was not until fieldwork by WJB and CH in 2009 that sufficiently informative material became available for study in the herbarium and laboratory. Recently, the species was

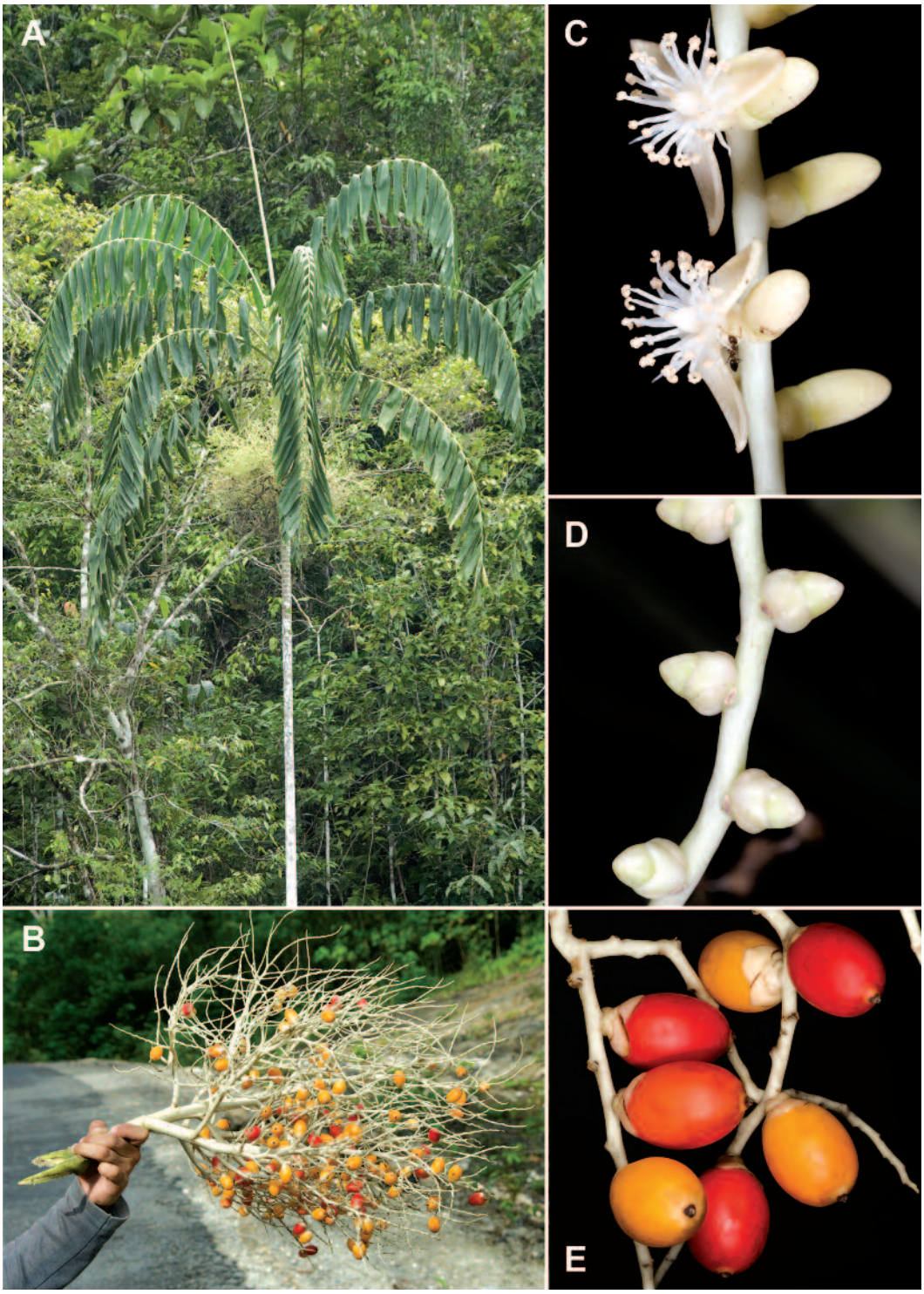
1. The distribution of the new genera, *Jailoloa*, *Manjekia* and *Wallaceodoxa,* in eastern Indonesia.





2. *Jailoloa halmaherensis*. **A**. In habitat in Halmahera. **B**. Staminate flowers. **C**. Pistillate flowers. **D**. Fruits.

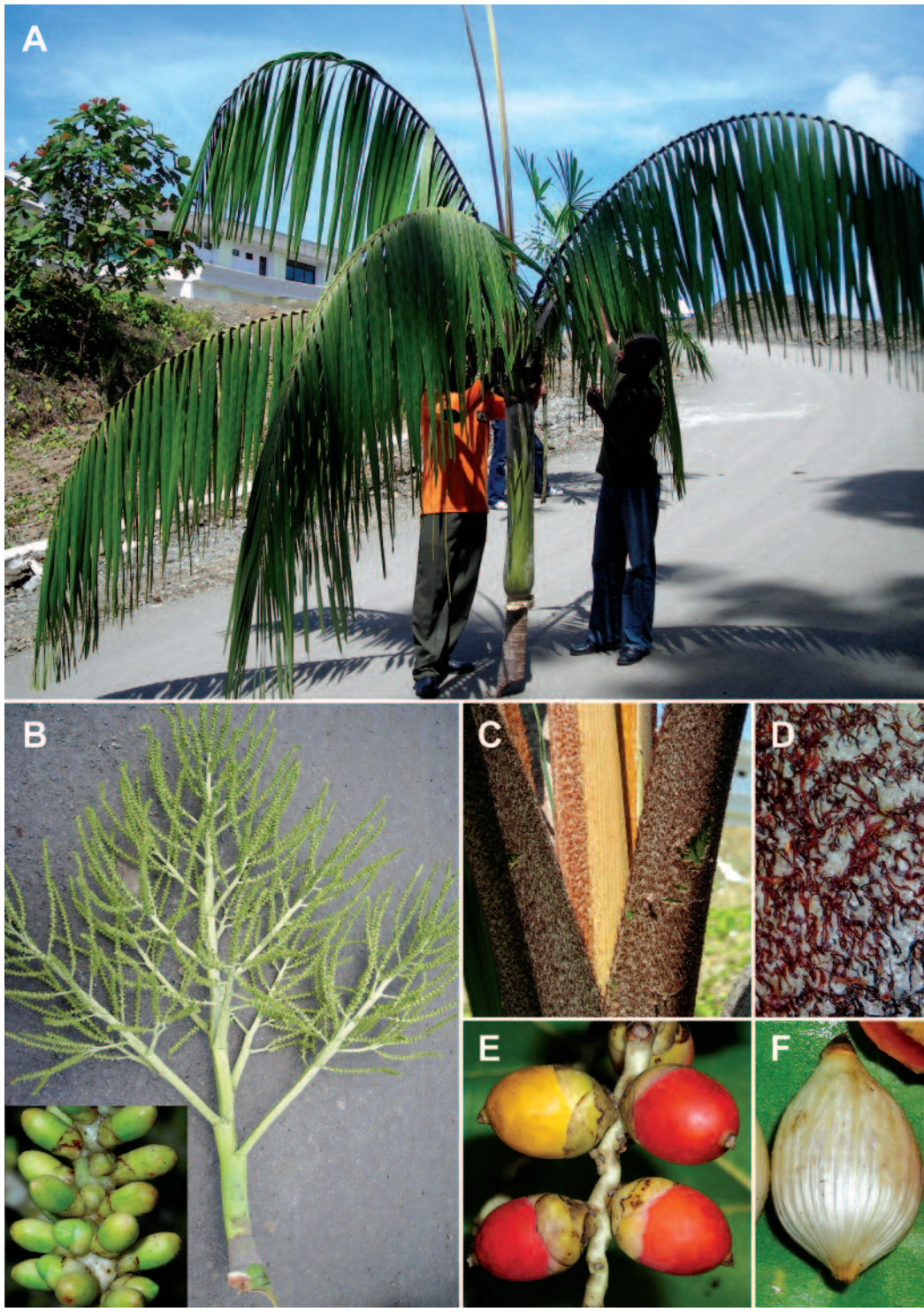
placed, somewhat uncomfortably, in *Adonidia* when it was described (Baker & Heatubun 2012) based on earlier molecular evidence (Zona et al. 2011). Although the inflorescence, fruits and seeds resembled the familiar *Adonidia merrillii*, the foliage of the new palm was startlingly different: long arching leaves with broad, pendulous leaflets. The new molecular data provided strong evidence that the species is not close to *A. merrillii*, and in fact, is most



3. *Manjekia maturbongsii*. **A**. In habitat. **B**. Infructescence. **C**. Staminate flowers. **D**. Pistillate flowers. **E**. Fruits.

closely related to *Jailoloa halmaherensis*. However, having few morphological features in common with *Jailoloa*, it required its own genus. The name *Manjekia* is based on *Manjek*, the local name in Biak dialect for this palm.

Manjekia maturbongsii is a medium-sized palm that can emerge above the surrounding vegetation, ultimately growing to 15 m tall. The stem is solitary, and bears a conspicuous crownshaft and a crown of ten or so leaves.



4. *Wallaceodoxa raja-ampat*. A. Crown. B. Inflorescence. Inset: densely-arranged flower buds. C. Petiole bases, showing hairs. D. Close-up of the white and brown hairs. E. Fruits. F. Endocarp.

The leaves are extraordinarily beautiful, gracefully arching and bearing broad, pendulous leaflets that are strongly truncate and jagged at the tips. The white rachillae bear fruits that ripen from green through orange to red. The endocarp is thin and terete, with both thick and thin, straw-colored fibers. The seed is terete; the endosperm is ruminate.

Manjekia maturbongsii is, at the moment, the only one of the three new genera that is in cultivation. It was brought into cultivation long before it had an official name and was seen during the IPS Biennial in 2012, in Nong Nooch Tropical Botanical Garden, in Thailand.

Wallaceodoxa

Wallaceodoxa raja-ampat (Fig. 4) has never been recognized previously within any other genus. This species was discovered by CH during an IPS-funded PoNG survey of the Raja Ampat Islands (Heatubun et al. 2014b), a small archipelago off the Bird's Head Peninsula of western New Guinea (Fig. 1). It grows on limestone in Gag and Waigeo Islands. The genus name, meaning "Wallace's Glory," honors Alfred Russel Wallace, intrepid explorer of the South-East Asian archipelago (including Waigeo), co-discoverer with Darwin of the mechanism of evolution by natural selection and (most importantly for palm enthusiasts) author of the first ever field guide to palms (Wallace 1853).

Wallaceodoxa raja-ampat is a robust, solitary palm. It has a conspicuous, green crownshaft and a sparse crown of arching leaves bearing long, narrow, pendulous leaflets. The apex of the crownshaft, the petiole and the base of the rachis are thickly covered with white, wooly hairs interspersed with dark, twisted hairs. The inflorescence is white, and the flowers are densely packed on the rachillae. The fruits ripen from green through yellow-orange to red. The endocarp is terete and covered with thin and thick, straw-colored fibers. The seed is terete, and the endosperm is ruminate.

What next?

With the comprehensive synthesis of palm knowledge provided just six years ago in the second edition of *Genera Palmarum* (Dransfield et al. 2008), one might have been forgiven for thinking that palm taxonomy was now stabilizing, but these new genera and others like them suggest that this is far from the case. Both the rain forest and the laboratory are frontiers for biodiversity exploration. These discoveries show that, despite decades of study, palms continue to awe and surprise us with spectacular novelties. New discoveries tend also to be threatened with extinction, and these new genera are no exception. The exploration of the world's palm diversity has never been more urgent and worthwhile.

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