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PRESS RELEASE

Discovery in the US of the New Guinea flatworm - one of the worst known invasive species

The land planarian *Platydemus manokwari*, or New Guinea flatworm, is a highly invasive species, already reported in many territories in the Pacific area, and as well as in France. This is the only land planarian in the “100 worst invasive alien species” list and it has now been found in additional localities including islands in the Pacific area, Puerto Rico, the first record in the Caribbean, and the first report in mainland US, in Florida.

Platydemus manokwari, the New Guinea flatworm, consumes land snails and thus endangers endemic species. Very flat, it measures 50 mm long and 5 mm wide, the back is a black olive colour with a clear central stripe, and it has a pale white belly. The head is elongated, with two prominent black eyes and the mouth is in the middle of the belly. Although it lives on the ground, it is able to climb trees to follow and consume native snails.

An international research effort in to the spread of this invasive species was made up of 14 co-authors from 8 countries and was led by Jean-Lou Justine of the Institute of Systematics, Evolution, Biodiversity, Paris, France (Muséum National d’Histoire Naturelle / CNRS / UPMC / EPHE). Their findings are published today in the Open Access Journal, PeerJ.

Specimens of the flatworm from various territories were identified by their characteristic appearance, a histological study and molecular analysis of the gene Cytochrome Oxidase Type I (which is often used to characterize animals). As a result, the species is now reported in additional countries and territories in the Pacific, including New Caledonia (mainland and Loyalty Islands), Tahiti (French Polynesia), Wallis and Futuna, Singapore, and the Solomon Islands, as well as in San Juan (Puerto Rico) and several gardens in Miami, Florida.

Two haplotypes (genetic variants) of the Cytochrome Oxidase Type I sequence were detected: the “World haplotype” found in France, New Caledonia, French Polynesia, Singapore, Puerto Rico and Florida; and the “Australian haplotype” found in Australia. The only locality with both haplotypes was in the Solomon Islands. The country of origin of *Platydemus manokwari* is New Guinea, and Australia and the Solomon Islands are the countries closest to New Guinea from which the researchers had specimens. This suggest that two haplotypes exist in the area of origin of the species, but that only one of the two haplotypes (the “World haplotype”) has, through human agency, been widely dispersed.

Platydemus manokwari is a known threat for endemic terrestrial molluscs. The record in Florida is of particular concern because it is in mainland America. Until now, infested territories were mostly islands, and the spread of the species from island to island is limited. However, the flatworms now established in Florida will not be subjected to these limitations. In addition to their natural spread, flatworms can

easily be passively spread with infested plants, plant parts and soil. Therefore, *Platydemus manokwari* could potentially spread from Florida throughout the US mainland, and this should be considered a significant threat to the whole of the US and even to the rest of the Americas.

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Images:

Zip file of high resolution images: http://static.peerj.com/pressReleases/2015/1037_images.zip



Title: *Platydemus manokwari* in Coral Gables, Florida.

Credit: Photograph by Makiri Sei. CC- BY 4.0



Title: *Platydemus manokwari* in Singapore.

Credit: Photograph by Andrew Wee Kien Han. CC- BY 4.0



Title: *Platydemus manokwari* in Nouméa, New Caledonia. Scale: cm and mm.

Credit: Photograph by Claire Goiran. CC- BY 4.0



Title. *Platydemus manokwari* in Fa'a'a, Tahiti, French Polynesia. Scale: cm and mm.

Credit: Photograph by Jonas Fernandez. CC- BY 4.0



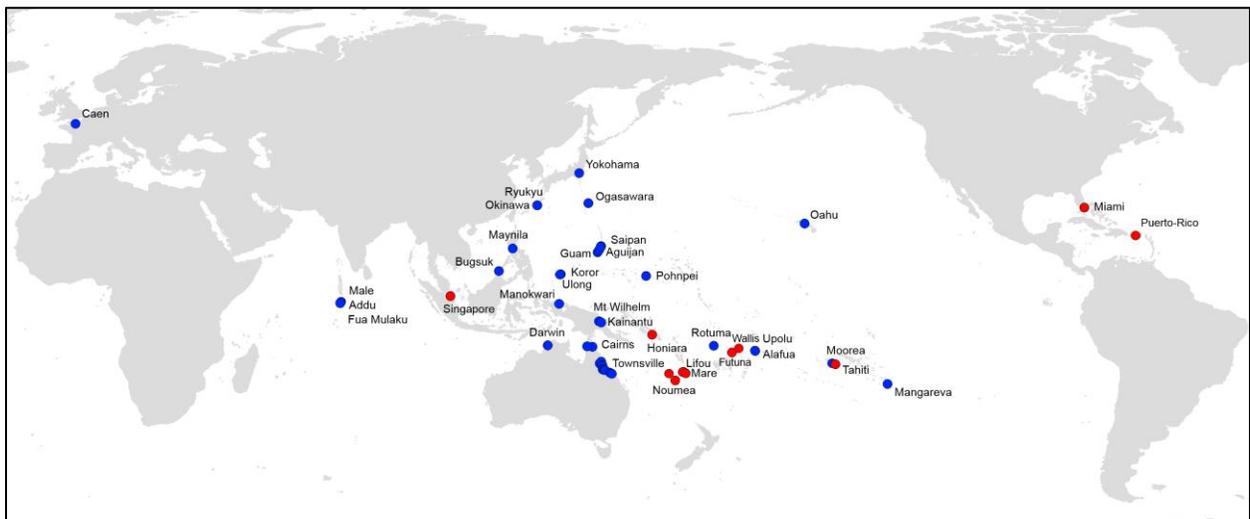
Title: *Platydemus manokwari*: Specimen collected in a greenhouse at Caen. You can see its white pharynx protruding from the underside, ingesting soft tissues of a specimen of the Mediterranean snail (*Eobania vermiculata*).

Credit: Photograph by Pierre Gros. CC BY 4.0



Title: *Platydemus manokwari* - Specimen collected in a hothouse, Caen, France. Dorsal view: note median longitudinal line.

Credit: Photograph by Pierre Gros. CC- BY 4.0



Title: *Platydemus manokwari*, map of distribution records. Blue: previous records; Red: new records reported in this paper.

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PDF of this Press Release: http://static.peerj.com/pressReleases/2015/PressReleasePeerJ_Justine.pdf

Zip file of High Resolution Images: http://static.peerj.com/pressReleases/2015/1037_images.zip

Links to the “100 Worst Invasive Species”: http://www.issg.org/worst100_species.html and http://www.issg.org/database/species/reference_files/100English.pdf

Link to the Press Preview of the Original Article (this link should only be used BEFORE the embargo ends): <http://static.peerj.com/press/previews/2015/06/1037.pdf>. Note: this is an author proof and so may change slightly before publication.

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Abstract (from the article):

The land planarian *Platydemus manokwari* de Beauchamp, 1963 or “New Guinea flatworm” is a highly invasive species, mainly in the Pacific area, and recently in Europe (France). We report specimens from five additional countries and territories: New Caledonia (including mainland and two of the Loyalty Islands, Lifou and Maré), Singapore, Solomon Islands, Puerto Rico, and Florida, USA. We analysed the COI gene (barcoding) in these specimens with two sets of primers and obtained 909 bp long sequences. In addition, specimens collected in Townsville (Australia) were also sequenced. Two haplotypes of the COI sequence, differing by 3.7%, were detected: the “World haplotype” found in France, New Caledonia, French Polynesia, Singapore, Florida and Puerto Rico; and the “Australia haplotype” found in Australia. The only locality with both haplotypes was in the Solomon Islands. The country of origin of *Platydemus manokwari* is New Guinea, and Australia and the Solomon Islands are the countries closest to New Guinea from which we had specimens. These results suggest that two haplotypes exist in the area of origin of the species, but that only one of the two haplotypes (the “World haplotype”) has, through human agency, been widely dispersed. However, since *P. manokwari* is now recorded from 21 countries in the world and we have genetic information from only 8 of these, with none from New Guinea, this analysis provides only partial knowledge of the genetic structure of the invasive species. Morphological analysis of specimens from both haplotypes has shown some differences in ratio of the genital structures but did not allow us to interpret the haplotypes as different species. The new reports from Florida and Puerto Rico are the firsts for the USA, for the American continent, and the Caribbean. *P. manokwari* is a known threat for endemic terrestrial molluscs and its presence is a matter of concern. While most of the infected territories reported until now are islands, the newly reported presence of the species in mainland US in Florida should be considered a potential major threat to the whole US and even the Americas.