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Discovery in France of the New Guinea flatworm - one of the 100 worst invasive alien species in the world

One of the consequences of globalization and increased worldwide freight trade is the introduction of invasive alien species. In the list of the 100 worst invasive alien species in the world, there is only one terrestrial flatworm: *Platydemus manokwari*, also called New Guinea flatworm. This species has now been found in France, Caen, and was identified by an international team led by Jean-Lou Justine of Institute of Systematics, Evolution, Biodiversity, Paris, France (Muséum National d'Histoire Naturelle / CNRS / UPMC / EPHE). This is the first discovery of the species in Europe, reported in an article to be published March 4th in the open-access journal PeerJ (<http://PeerJ.com>).

The damaging effects of the New Zealand flatworm, *Arthurdendyus triangulatus* are already known in Europe. This species has invaded the whole north of the British Isles, including Scotland and Northern Ireland, and is responsible for significant reductions in populations of earthworms. To prevent its spread to other regions, measures have been implemented by some European countries. This species has so far never been found in France.

Now, another flatworm has been found in France and in Europe for the first time: the New Guinea flatworm, *Platydemus manokwari*. These flatworms were found in a greenhouse of the Jardin des Plantes de Caen (Normandy), and were identified by their characteristic appearance and molecular analysis of gene Cytochrome Oxidase Type I, often used to characterize animals. As one of the 100 most invasive alien species in the world any new discovery is clearly very concerning.

Platydemus manokwari, which was introduced - sometimes deliberately - in over fifteen territories in the Pacific, has become invasive and it consumes land snails, endangering endemic species. Indeed, although living on the ground, it is able to climb on trees to follow the snails. Very flat, it measures 50 mm long and 5 mm wide, the back is a black olive colour with a clear central stripe, and with a pale white belly. The head is elongate, with two prominent black eyes. The mouth is in the middle of the belly.

The New Guinea flatworm, although from a tropical country, inhabits the mountainous regions of New Guinea at an altitude of 3000 meters, so it can survive relatively cool temperatures down to 10 ° C. Thus, it is not impossible that the species could spread into the environment in France and much of Europe. Moreover, it was observed in the laboratory to be capable of consuming European snails. Apart from the flatworm being a threat to snails, one of the main dangers of this case is that the diet of *Platydemus manokwari* is very diverse and in the absence of snails it can feed on numerous soil-dwelling species, including earthworms.

Platydemus manokwari represents a new and significant threat to biodiversity in France and Europe, which hosts hundreds of species of snails, some of which are endangered and protected. It is therefore important to consider the implementation of eradication and control of this flatworm.

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Images



Figure 5 from the article: *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*). © & Photo credit: Pierre Gros

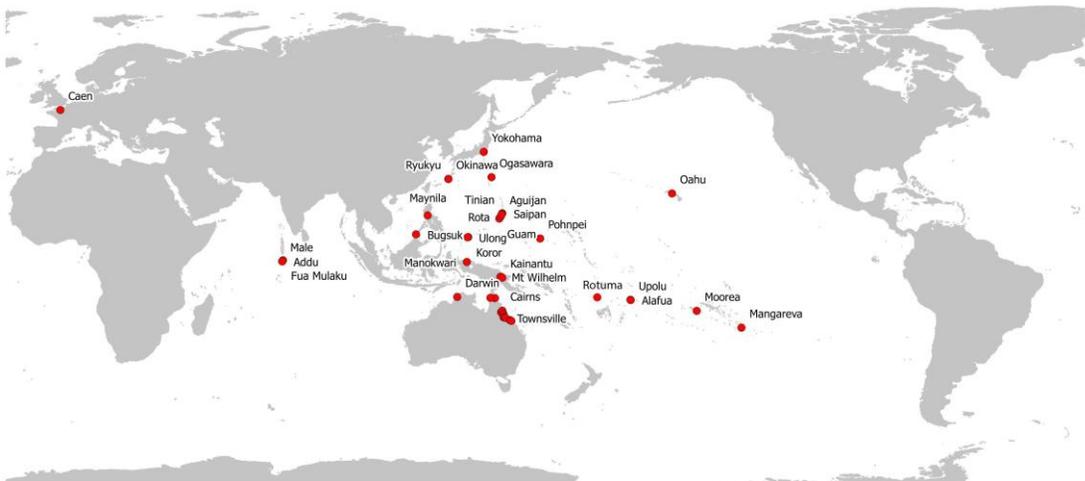


Figure 6 from the article: World distribution of *Platydemus manokwari* © MNHN – SPN – J. Thévenot



Fig 1 from the article: *Platydemus manokwari* - Specimen collected in a hothouse, Caen, France. Dorsal view: note median longitudinal line. © & Photo credit: Pierre Gros



Figure 2 from the article: *Platydemus manokwari* - Detail of head, lateral view, showing one of the two slightly protuberant eyes. © & Photo credit: Pierre Gros



Figure 4 from the article: *Platydemus manokwari* - Partial ventral view, showing the cream and faint grey marginal stripe, and the creeping sole that is slightly paler along the median line. Scale: millimeters. © & Photo credit: Pierre Gros

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http://www.issg.org/database/species/reference_files/100English.pdf
- Jean-Lou Justine's Website (citizen science about invasive flatworms in France):
<http://bit.ly/Plathelminthe> , Twitter: <https://twitter.com/Plathelminthe4>
- Inventaire National du Patrimoine naturel INPN, Paris, France: <http://inpn.mnhn.fr/>

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Abstract (from the article):

Non-indigenous terrestrial flatworms (Platyhelminthes) have been recorded in thirteen European countries. They include *Bipalium kewense* and *Dolichoplana striata* that are largely restricted to hothouses and may be regarded as non-invasive species. In addition there are species from the southern hemisphere such as the invasive New Zealand flatworm *Arthurdendyus triangulatus* in the United Kingdom, Eire and the Faroe Islands, the Australian flatworm *Australoplana sanguinea alba* in Eire and the United Kingdom, and the Australian Blue Garden flatworm *Caenoplana coerulea* in France, Menorca and the United Kingdom. The United Kingdom has some twelve or more non-indigenous species most of which are Australian and New Zealand species. These species may move to an invasive stage when optimum environmental and other conditions occur, and the flatworms then have the potential to cause economic or environmental harm. In this paper, we report the identification (from morphology and molecular analysis of COI sequences) of non-indigenous terrestrial flatworms found in a hothouse in Caen (France) as the New Guinea flatworm *Platydemus manokwari* de Beauchamp, 1963 (Platyhelminthes, Continenticola, Geoplanidae, Rhynchodeminae). *Platydemus manokwari* is among the "100 World's Worst Invader Alien Species". Lists of World geographic records, prey in the field and prey in laboratories of *P. manokwari* are provided. This species is considered a threat to native snails wherever it is introduced. The recent discovery of *P. manokwari* in France represents a significant extension of distribution of this Invasive Alien Species from the Indo-Pacific region to Europe. If it escaped the hothouse, the flatworm might survive winters and become established in temperate countries. The existence of this species in France requires an early warning of this incursion to State and European Union authorities, followed by the eradication of the flatworm in its locality, tightening of internal quarantine measures to prevent further spread of the flatworm to and from this site, identifying if possible the likely primary source of the flatworm, and tracing other possible incursions that may have resulted from accidental dispersal of plants and soil from the site.