Checklist of the terrestrial and freshwater arthropods of French Polynesia (Chelicerata; Myriapoda; Crustacea; Hexapoda)

Thibault RAMAGE
9 quartier de la Glacière, F-29900 Concarneau (France)
and Service du Patrimoine naturel, Muséum national d'Histoire naturelle,
case postale 41, 57 rue Cuvier, F-75231 Paris cedex 05 (France)
thibault.ramage@hotmail.fr

Published on 30 June 2017

urn:lsid:zoobank.org:pub:51C2E5A2-0132-48B6-A747-94F37C349B36

Ramage T. 2017. — Checklist of the terrestrial and freshwater arthropods of French Polynesia (Chelicerata; Myriapoda; Crustacea; Hexapoda). *Zoosystema* 39 (2): 213-225. https://doi.org/10.5252/z2017n2a3

ABSTRACT
An annotated checklist for the terrestrial and freshwater arthropods of French Polynesia is presented. Compiled with the help of 48 experts and based on published records, it comprises 3025 valid species names belonging to the classes of Hexapoda Blainville, 1816 (2556 species), Chelicerata Heymons, 1901 (367 species), Myriapoda Latreille, 1802 (22 species) and Crustacea Pennant, 1777 (80 species). Reported are 1841 taxa from the Society Islands, followed by the Marquesas Islands with 1198 taxa, the Austral Islands with 609 taxa, the Tuamotu Islands with 231 taxa and the Gambier Islands with 186 taxa. The specificity of this fauna and the analysis of each class and order are discussed. The level of endemism is particularly high, 61% of the known species, with non-native species representing 13% of the overall species count. The threats to the native fauna and flora of French Polynesia and particularly to endemic insect species are detailed.

KEY WORDS
Species database, endemism, biogeography, speciation, threats to endemic species.

RÉSUMÉ
Liste de référence des arthropodes terrestres et d'eau douce de Polynésie française (Chelicerata; Myriapoda; Crustacea; Hexapoda).
Une liste de référence annotée des arthropodes terrestres et d'eau douce de Polynésie française est présentée. Compilée avec l'aide de 48 experts et basée sur les ouvrages publiés, elle comprend 3 025 espèces valides appartenant aux classes des Hexapoda Blainville, 1816 (2 556 espèces), Chelicerata Heymons, 1901 (367 espèces), Myriapoda Latreille, 1802 (22 espèces) et Crustacea Pennant, 1777 (80 espèces). Des îles de la Société sont répertoriés 1 841 taxons, suivis des Îles Marquises avec 1 198 taxons, des Îles Australes avec 609 taxons, des Tuamotu avec 231 taxons et enfin des Gambier avec 186 taxons. La spécificité de cette faune et l'analyse de chaque classe et ordre sont discutées. Le niveau d'endémisme est particulièrement élevé, représentant 61% des espèces connues, les espèces introduites représentant 13% du nombre total d'espèces. Les menaces pesant sur la faune et la flore native de Polynésie française et en particulier sur les insectes endémiques sont détaillées.

MOTS CLÉS
Base de données, endémisme, biogéographie, spéciation, menaces pour les espèces endémiques.

INTRODUCTION

Islands, and especially tropical islands, are known as biodiversity hotspots due to the concentration of endemic species in small territories. It has been demonstrated that, taken collectively, islands contribute disproportionately for their area to global species totals (Whittaker & Fernández-Palacios 2009). But these islands are also heavily threatened by habitat loss and other human activities. French Polynesia is part of the Polynesia-Micronesia hotspot, one of 34 biodiversity hotspots identified by Conservation International. This hotspot is also an epicentre of the current global extinction crisis (Conservation International). The assessment of the biodiversity of French Polynesia and its conservation status must therefore be seen as a top priority. This checklist aims at contributing to this effort.

Isolated in the middle of the South Pacific Ocean and more than 5000 km from the nearest continent, French Polynesia is composed of 118 islands and atolls which are divided into five archipelagos: the Austral Islands, the Gambier Islands, the Marquesas Islands, the Society Islands, and the Tuamotu Islands (Dupon *et al.* 1993). Their isolation explains both the poverty (small number of species) and the uniqueness (high level of endemism) of this insular fauna (Fig. 1).

The Austral, Gambier, Marquesas and Society archipelagos are mainly composed of high islands while the Tuamotu archipelago is composed of low islands with the exception of Makatea. The highest biodiversity and especially most of the endemics are located on the high islands (Whittaker & Fernández-Palacios 2009). These high islands host rare and characteristic habitats such as the montane cloud forest where many endemic species are found.

MATERIAL AND METHODS

The checklist in Appendix 1 was compiled using all literature published and Global Species Databases available online up to December 2016 which are listed in the Appendix 2. The following 48 experts kindly checked and improved order or family checklists compiled by the author (Alexander Anichtchenko, Manfred Asche, Bradley Balukjian, Jérôme Barbut, Charles Bellamy, Patrick Bonneau, James Carpenter, Gerasimos Cassis, Fabio Cassola, Jacques Chassain, Robert Constantin, Michaël Dierkens, Alain Duhamel, Neal Evenhuis, Sergei Golovatch, Yves Gomy, Jiří Háva, Hannelore Hoch, Roman Hołyński, Jan Horák, Sylvain Hugel, Jiří Kolibáč, Guillermo Kuschel, Mathieu Lagarde, Marc Lacroix, James Liebherr, Antoine Mantilleri, Vincent Nicolas, Franck Noël, Peter Oboyski, Massimo Olmi, Georges Orhant, Hélène Perrin, Dan Polhemus, Joseph Poupin, David Rider, Jean-Philippe Roguet, Pascal Rousse, Roger Roy, Allan Samuelson, Rudolf Schuh, Emmanuel Séchet, Andrè Skale, Mikael Sörensson, Tim Struyve, Jérôme Sudre, Mick Webb and Tadeusz Zatwarnicki). It is possible that some species names are obsolete for some orders or families for which no specialist nor global species database were found.

As in the checklist of insects of French Guiana (Brûlé & Touroult 2014) and of the island of Guadeloupe (Meurgey & Ramage, unpublished data), this checklist is part of the national taxonomic database, Taxref (Gargominy *et al.* 2016), on behalf of the natural heritage inventory of France (MNHN, online). The checklist of the terrestrial and freshwater arthropods of French Polynesia is also available online (http://inpn.mnhn.fr/programme/referentiel-taxonomique-taxref?lg=en) and will be updated on a yearly basis.

Although this checklist deals with the terrestrial and freshwater arthropods of French Polynesia, three species of *Halobates* Eschscholtz, 1822 (Gerridae Leach, 1815) and two species of *Hermatobates* Carpenter, 1892 (Hermatobatidae Coutière & Martin, 1901), all being marine Hemiptera Linnaeus, 1758 species, have been included such that all the insects reported from French Polynesia are listed.

The same endemism percentage calculation as for the flora of French Polynesia was used: % = E + S / E + S + C + P + D (Florence & Moretti 2006). As explained in the discussion, distinguishing native species from those introduced by Polynesians or Austronesians is not an easy task. Nick Porch's work on insects subfossils from French Polynesia (Porch & Smith 2017) or Horrocks' work on insects subfossils from Easter Island (Horrocks *et al.* 2013) help to improve our knowledge of the biogeographical status of insects in Polynesia. Their upcoming publications will therefore change the endemism and introduction percentages by changing the biogeographical status of many species.

Available online

The checklist and its references are available to download from http://www.zoosystema.com

Appendix 1. — Checklist of the terrestrial and freshwater arthropods of French Polynesia.

Appendix 2. — References used for the checklist.

Abbreviations

The biogeographical status of each species is specified as explained below:

C	cryptogenic taxa (either a native or an introduced species);
D	doubtfull taxa (probably label errors);
E	endemic taxa (endemic to a single or several islands, or to a single or several archipelagos of French Polynesia);
I	introduced taxa (non-native species);
P	present taxa (either native or status not known);
S	sub-endemic taxa (endemic to Eastern Polynesia, including French Polynesia, Cook Islands, Pitcairn Islands and Easter Island);
Q	taxa mistakenly reported from French Polynesia;
Y	introduced taxa which didn't establish.

The distribution of each taxon within French Polynesia is detailed by archipelago:

AUS	Austral Islands;
GAM	Gambier Islands;
MAR	Marquesas Islands;
SOC	Society Islands;
TUA	Tuamotu Islands.

RESULTS

Taxonomic disharmony and speciation

The terrestrial and freshwater arthropod fauna of French Polynesia is a peculiar fauna, with several missing classes and orders among the Chelicerata Heymons, 1901 and Hexapoda Blainville, 1816 called taxonomic disharmony (Roderick & Gillespie 2016).

Among the Arachnida Cuvier, 1812 (Chelicerata), no Amblypygi Thorell, 1883, Opiliones Sundevall, 1833, Palpigradi Thorell, 1888, Ricinulei Thorell, 1876, Schizomida Petrunkevitch, 1945, Solifugae Sundevall, 1833 nor Thelyphonida Latreille, 1804 are reported from the 118 islands of French Polynesia except for one species of Schizomida recently collected on Tahiti, this species being probably an introduced one.

Among the Hexapoda, no Diplura Börner, 1904, Protura Silvestri, 1907, Archaeognatha Börner, 1904, Ephemeroptera Hyatt & Arms, 1890, Grylloblattodea Brues & Melander, 1932, Mantophasmatodea Zompro, Klass, Kristensen & Adis, 2002, Mecoptera Packard, 1886, Megaloptera Latreille, 1802, Plecoptera Burmeister, 1839, Raphidioptera Martynov, 1938, Strepsiptera Kirby, 1813, Trichoptera Kirby, 1813 nor Zoraptera Silvestri, 1913 are reported from this territory except for one undescribed species of Trichoptera recently collected in the Marquesas Islands (Polhemus & Englund 2016) and for Strepsiptera paratizing a *Polistes* sp. (Vespidae Latreille, 1802) in the Society Islands (Rageau 1959).

Much of the Pacific Basin was colonized primarily from New Guinea and adjacent areas via over-water dispersal. Small islands played the role of "stepping stones" and facilitated dispersal across the Pacific (Miller 1996). Munroe (1996) showed that there is a progressive decrease in the number of founding stocks and an increase in the proportion of radiating speciation with distance from Papuan source areas, also known as the "radiation zone" (MacArthur & Wilson 1967). Numbers of species show more relationship to area than distance, because local speciation has compensated for a lack of colonizers.

The absence of these many taxonomic groups is to some degree counterbalanced by the impressive speciation of several genera. This speciation includes two types: single or very few island endemics in each of the high islands, vs extraordinary evolutionary radiation of a single genus on a single island.

The first kind of speciation is the most common in French Polynesia. A good example is the weevil genus *Rhyncogonus* Sharp, 1885 (Coleoptera Linnaeus, 1758) (Fig. 3). *Rhyncogonus* have a distribution restricted to the Hawaiian Islands and to Eastern Polynesia (French Polynesia, Cook Islands and Pitcairn Islands). Sixty-four species of *Rhyncogonus* are reported from French Polynesia, all of them being single island endemics with the exception of *Rhyncogonus pulvereus* Van Dyke, 1937 which is known from both Raiatea and Taha'a which share the same lagoon. At least 14 species of this genus from French Polynesia are still undescribed, ten from the Society Islands, three from the Austral Islands, and one from the Gambier Islands (Ramage & Duhamel 2015).

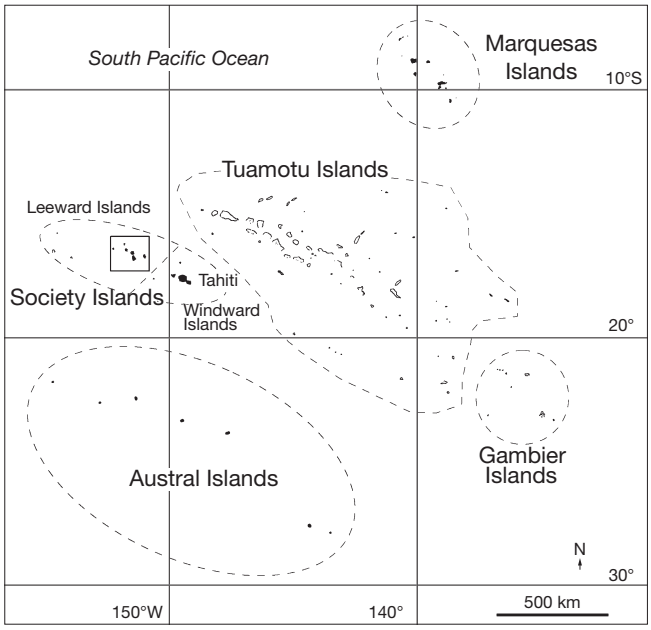

Fig. 1. — Map of French Polynesia (map from F. Jacq).

The genera *Nesosydne* Kirkaldy, 1907, *Oliarus* Stål, 1862, *Oteana* Hoch, 2006, *Lallemandana* China & Myers, 1934, *Nabis* Latreille, 1802, *Campylomma* Reuter, 1878 (Hemiptera Linnaeus, 1758), *Sierola* Cameron, 1881 (Hymenoptera Linnaeus, 1758), *Carpelimus* Kirby, 1819, *Tahitia* Coiffait, 1976, *Melanoxanthus* Eschscholtz, 1833, *Cis* Latreille, 1796, *Ampagia* Pascoe, 1870, *Miocalles* Pascoe, 1883 (Coleoptera), *Erechthias* Meyrick, 1880, *Dichelopa* Lower, 1901, *Eudonia* Billberg, 1820 (Lepidoptera Linnaeus, 1758), *Gonomyia* Meigen, 1818, *Simulium* Latreille, 1802 and *Campsicnemus* Haliday in Walker, 1851 (Diptera Linnaeus, 1758) more or less agree with this first kind of speciation, some of them being more represented in one archipelago.

The second kind of speciation is known in French Polynesia for two genera of Coleoptera, *Mecyclothorax* Sharp, 1903 (Carabidae Latreille, 1802) on the island of Tahiti, and *Miocalles* (Curculionidae Latreille, 1802) on the island of Rapa iti.

The genus *Mecyclothorax* (Carabidae) contains 107 of the 112 known endemic carabids of French Polynesia. Of these 107 species, 100 are endemic to Tahiti, the seven others being endemic to Moorea, Tahiti's sister island. Most of the *Mecyclothorax* live above 900 m in preserved habitats with every summit of Tahiti hosting its own set of local endemic species. Species of this genus are indeed highly vulnerable to habitat loss and invasive species because of their restricted distribution (Liebherr 2013).

The genus *Miocalles* is represented in French Polynesia by 103 species, all of them endemic and apterous. The *Miocalles* fauna of French Polynesia is exceptional with its highly diverse radiation on the island of Rapa, with 67 endemic to this 40 km² island. Most of these species have a restricted range of host plants but those sharing the same host species develop on different parts of the plant (Paulay 1985).

Major publications

Fairmaire (1849, 1850) was the first to focus on the arthropod fauna of French Polynesia. He mostly described or reported pan-Pacific species from this territory but also described some endemics.

Later this fauna was intensively studied between 1926 and 1940 thanks to the collections of Saint-George and the Pacific Entomological Survey (Fig. 2) (Ramage *et al.* 2015b). These expeditions collected 859 species that were described during this period, representing 33% of the native arthropod fauna of French Polynesia.

Later, Clarke's work on Lepidoptera (1971, 1986), Hammer's work on Sarcoptiformes Reuter, 1909 (1972), Coiffait's work on Staphylinidae Latreille, 1802 (Coiffait 1976, 1977, 1980), and Georges Perrault's work on Carabidae (Perrault1977, 1978, 1979, 1980, 1982, 1984, 1986, 1988, 1989, 1990) added 460 new species to this fauna, representing 18% of native fauna. Coiffait & Perrault worked on Jean Gourvès & Gérard Perrault's collections, the latter two lived on Tahiti and intensively collected there, especially in the mountains. Their collections still contain dozens of undescribed species.

Prior to this checklist, only Paulian (1998) and Nishida (2009) did compilations of published records of the arthropod fauna of French Polynesia. These two works unfortunately lacked the correction by specialists and the homogenous control of synonymies/combinations. The absence of such a checklist gave the author a reason for realising it.

Description of the terrestrial and freshwater arthropod fauna of French Polynesia

With 61% of its native species being endemic (Table 1), arthropod endemism of French Polynesia is similar to the flora (62%) and avifauna (64%), but far less than the exceptional level of endemism of the snail fauna (95%) (Gargominy & Bocquet 2013).

The Society Islands archipelago hosts 1 841 arthropod taxa with 579 (34%) being endemic compared to 1 198 taxa reported from the Marquesas Islands with 637 (53%) being endemic. The third archipelago with several high islands, the Austral Islands, host 609 taxa of which 255 are archipelago endemics (42%). The Tuamotu Islands with 13 endemics (6%) among the 231 taxa reported and Gambier Islands with eight endemics (5%) among the 186 taxa reported host only a small part of the arthropod fauna of French Polynesia. The difference in relative endemism between the Society Islands and the Marquesas Islands may be explained by research effort. The endemic fauna of both archipelagos has been well studied, however the introduced fauna of the Society Islands, especially Tahiti, has received far greater attention. The seemingly isolated archipelagos of French Polynesia are in fact well connected to other Pacific archipelagos, New Zealand and South America with high frequencies of passenger and freight ship docking (Groom *et al.* 2016). Both international port and airport of French Polynesia are located on Tahiti. This implies that the introduced entomofauna of Tahiti is likely to be more numerous than in no other islands in French Polynesia, as observed with the ant fauna (Ramage 2014).

Most of the endemism in French Polynesia is single island endemism or archipelago endemism. 62 taxa are endemic to French Polynesia and known from at least two archipelagos, and it is likely that these species will be found in the neighbouring archipelagos (Pitcairn Islands and Cook Islands) such as the 13 taxa endemic to Eastern Polynesia.

The Chelicerata are represented by 367 species, 38% of which are endemic, and distributed as follows: 113 species of spiders (Araneae Clerck, 1757), four species of pseudoscorpions (Pseudoscorpiones De Geer, 1778), two species of scorpions (Scorpiones C. L. Koch, 1851) and 248 species of acari (Ixodida Leach, 1815, Mesostigmata Canestrini, 1891, Trombidiformes Reuter, 1909 and Sarcoptiformes Reuter, 1909).

49 species of the 113 spiders reported from French Polynesia are endemic. This endemism is particularly well represented in the families Salticidae Blackwall, 1841 and Tetragnathidae Menge, 1866 (Fig. 6).

The pseudoscorpions have not been studied in French Polynesia since the 1930s, with the four species reported also known from most of the South Pacific islands.

Two species of scorpions are present in French Polynesia, one being a pantropical species, the other being known from Asia and the Pacific.

Most of the biodiversity of the acari of French Polynesia belongs to the order Sarcoptiformes, with 187 species, 59 being endemic. According to Hammer (1972) and Hammes & Putoa (1986), the acari of French Polynesia, especially those of the Austral and Marquesas Islands, are not well studied and likely contain many undescribed species.

One species of the order Schizomida has been collected recently on Tahiti but it has not been identified yet.

The Myriapoda are represented in French Polynesia by 22 species, three of them being endemic. Like many other taxonomic groups, the Myriapoda of French Polynesia have not been studied since the 1930s. An introduced species of *Desmoxytes* Chamberlin, 1923 has been recently collected on Tahiti (unpublished data). 14% of the Myriapoda species of French Polynesia are endemic.

The terrestrial, freshwater, and brackish water Crustacea are represented in French Polynesia by 80 species, and divided as follows: 12 species of Amphipoda Latreille, 1816, 34 species of Decapoda Latreille, 1803, 29 species of Isopoda Latreille, 1817, three species of Maxillopoda Dahl, 1956, and two species of Ostracoda Latreille, 1802. 30% of the Crustacea species of French Polynesia are endemic.

The Amphipoda of French Polynesia are terrestrial or freshwater species, and can be found from the sea level to the top of the highest moutains of Tahiti. Seven of the 12 species are endemic.

All 34 Decapoda of French Polynesia are pan-Pacific species with the exception of *Macrobrachium feunteuni* Keith & Vigneux, 2002 and *Caridina rapaensis* Edmondson, 1935, the first being endemic to the Marquesas Islands, the second to the Austral Islands.

Fourteen of the 29 Isopoda of French Polynesia are endemic. This fauna has not been studied since the 1940s and more endemic species may be discovered, such as the peculiar

Fig. 2. — *Rhyncogonus* sp. from Raiatea. Photograph: F. Jacq.

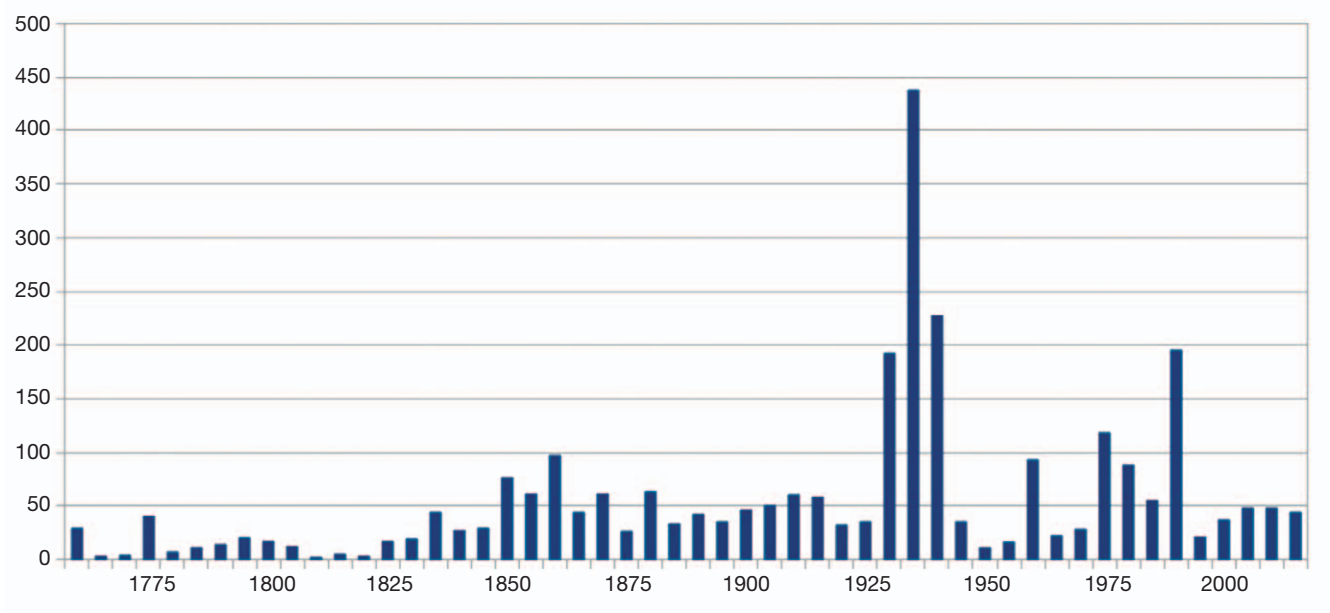

Fig. 3. — Number of described species from the French Polynesia fauna by five year period from Linnaeus to 2016.

TABLE 1. — Repartition of French Polynesia species among different biogeographical categories.

Taxa	Cryptogenic	Doubtful	Endemic or sud-endemic	Introduced	Present	Total
Arachnida Cuvier, 1812	–	–	–	–	–	367
Araneae Clerck, 1757	–	2	49	21	41	113
Ixodida Leach, 1815	–	–	–	3	1	4
Mesostigmata Canestrini, 1891	–	–	15	3	9	27
Pseudoscorpiones De Geer, 1778	–	–	–	–	4	4
Scorpiones C.L. Koch, 1851	–	–	–	1	1	2
Trombidiformes Reuter, 1909	–	–	1	2	27	30
Sarcoptiformes Reuter, 1909	–	–	59	11	117	187
Chilopoda Latreille, 1817	–	–	–	–	–	11
Geophilomorpha Pocock, 1895	–	–	1	–	3	4
Scolopendromorpha Pocock, 1895	–	–	2	–	5	7
Diplopoda de Blainville *in* Gervais, 1844	–	–	–	–		10
Polydesmida Pocock, 1887	–	–	–	–	5	5
Spirobolida Cook, 1895	–	–	–	–	3	3
Spirostreptida Brandt, 1833	–	–	–	–	2	2
Symphyla Ryder, 1880	–	–		–	1	1
Malacostraca Latreille, 1802	–	–	–	–	–	75
Amphipoda Latreille, 1816	–	1	7	–	4	12
Decapoda Latreille, 1802	–	5	2	–	27	34
Isopoda Latreille, 1817	–	–	14	–	15	29
Maxillopoda Dahl, 1956	–	–	–	–	–	3
Cyclopoida Burmeister, 1834	–	–	–	–	3	3
Ostracoda Latreille, 1802	–	–	–	–	–	2
Podocopida G.O. Sars, 1866	–	–	1	–	1	2
Collembola Lubbock, 1870	–	–	–	–	–	33
Entomobryomorpha Börner, 1913	–	1	5	–	16	22
Neelipleona Massoud, 1971	–	–	–	–	1	1
Poduromorpha Börner, 1913	–	–	6	–	2	8
Symphypleona Börner, 1901	–	–	2	–	–	2
Insecta Linnaeus, 1758	–	–	–	–	–	2497
Blattodea Brunner von Wattenwyl, 1882	–	–	11	9	9	29
Coleoptera Linnaeus, 1758	–	26	473	60	221	780
Dermaptera De Geer, 1773	–	–	1	3	5	9
Diptera Linnaeus, 1758	2	1	210	43	86	342
Embioptera Lameere, 1900	–	–	–	–	1	1
Hemiptera Linnaeus, 1758	–	11	231	114	59	415
Hymenoptera Linnaeus, 1758	12	2	65	82	35	196
Lepidoptera Linnaeus, 1758	–	–	363	27	115	505
Mantodea Burmeister, 1838	–	–	–	1	–	1
Neuroptera Linnaeus, 1758	–	–	7	–	7	14
Odonata Fabricius, 1792	–	–	8	–	11	19
Orthoptera Olivier, 1789	–	3	16	–	14	33
Phasmida Leach, 1815	–	–	–	–	2	2
Psocodea Hennig, 1953	–	–	9	26	48	83
Siphonaptera Latreille, 1825	–	–	–	4	–	4
Thysanoptera Haliday, 1836	–	–	9	10	40	59
Zygentoma Börner, 1904	–	–	3	–	2	5
Total	14	52	1570	420	943	2999

marquesan endemic *Echinodillo montanus* Jackson, 1933 and *Tridentodillo squamosus* Jackson, 1933 (Fig. 4).

Three Maxillopoda and two Ostracoda are reported from French Polynesia, one of the latter being endemic to the Marquesas Islands, *Cypretta nukuhivana* Furtos, 1934.

The Hexapoda are represented in French Polynesia by 2530 species, not including three introduced species that didn't establish nor 23 species that have been mistakenly reported for these islands.

The Collembola Lubbock, 1870 are represented in French Polynesia by 33 species, with 13 (39%) of them being endemic. This fauna, especially in the Austral, Marquesas and Society Islands, has been understudied.

The Insecta Linnaeus, 1758 are represented in French Polynesia by 2497 species, with 1407 being endemic (67%).

Of the five Zygentoma Börner, 1904 species reported from French Polynesia, three are endemic of the Marquesas Islands.

Fig. 4. — *Misumenops melloleitaoi* Berland, 1942 from Tahiti. Photograph: F. Jacq.

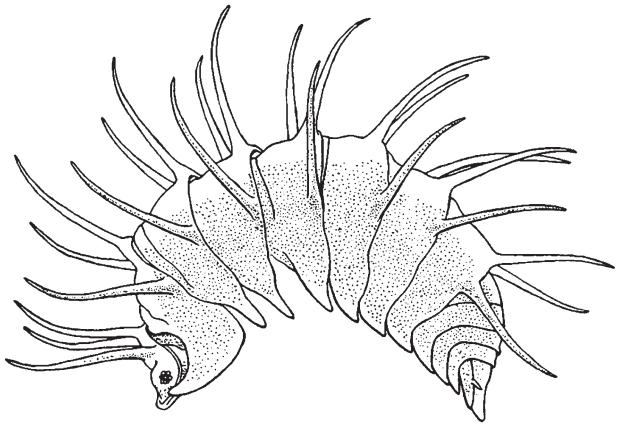

Fig. 5. — *Tridentodillo squamosus* Jackson, 1933 (after Jackson 1933b).

Fig. 6. — *Ischnura cardinalis* Kimmins, 1929 from Taha'a. Photograph: F. Jacq.

The Odonata Fabricius, 1792 are represented by 19 species, 11 species of Anisoptera Selys, 1854, all widespread at least in the Pacific except one endemic to the Marquesas Islands, and eight species of Zygoptera Selys, 1854, seven of them being endemic (Fig. 5). Several additional Zygoptera species from the Marquesas and Society Islands are new to science and are currently being described.

The Dermaptera De Geer, 1773 are represented by nine species in French Polynesia, with only one endemic species that appears restricted to the summits of Tahiti.

16 of the 33 species of Orthoptera Olivier, 1789 of French Polynesia are endemic. This fauna has been relatively well studied but several Gryllidae new to science are still waiting to be described (pers. obs.).

FIG. 7. — *Raiateana oulietea* Boulard, 1979 from Raiatea. Photograph: F. Jacq.

One species of Embioptera Lameere, 1900, *Aposthonia oceania* (Ross, 1951), is reported from French Polynesia and is also known from Micronesia.

Two pan-Pacific species of Phasmida Leach, 1815 are reported from French Polynesia. One of them, *Graeffea crouanii* (Le Guillou, 1841), seems to be a pest of coconut palms.

The order Mantodea Burmeister, 1838 is of recent introduction in French Polynesia and is represented by one species native to South-East Asia, *Tropidomantis tenera* (Stål, 1858).

The Blattodea Brunner von Wattenwyl, 1882 are represented in French Polynesia by 19 species of cockroaches, while there are nine species of termites (Isoptera). The eight endemic species of cockroaches are found exclusively in the Marquesas Islands. Two species of termites are endemic to French Polynesia, but considering the biogeography of termites in the Pacific, it is likely that these endemic species are synonyms of more widespread species.

The Thysanoptera Haliday, 1836 are represented in French Polynesia by 59 species, nine of them being endemic. This fauna was poorly known prior to Hoddle *et al.* 2008 work, which focused on the Austral, Marquesas and Society Islands.

The Hemiptera are represented in French Polynesia by 415 species, divided into 42 families and including 231 endemic species (77%). Among the Heteroptera Latreille, 1810, the Miridae Hahn, 1831 contain the highest number of endemics, with 34 species (out of 44 species present). Among the Auchenorrhyncha Duméril, 1806, the Delphacidae Leach, 1815 are represented by 36 endemics (among 48 species), the Cixiidae Spinola, 1839 by 32 species, all endemics, the Cicadellidae Latreille, 1802 by 27 endemics (among 43 species) and the Aphrophoridae Amyot & Audinet-Serville, 1843 by 22 species, all endemic.

The mysterious endemic cicada of Raiatea, *Raiateana oulietea*, was described only in 1979 by Michel Boulard from the MNHN (Fig. 7). It is strange that this big and loud species, easily spotable, was not reported earlier. This single island endemic is the only representative of the Cicadoidea in French Polynesia, with its closest relatives living 2400 km away from Raiatea, in Samoa. The reason why this species is not found on Raiatea's sister island, Taha'a, which shares the same lagoon, or on other Leeward Islands is still unknown.

Without Thornton's work on the Psocodea (Psocoptera Shipley, 1904 part) of the Pacific (Thornton 1981a, b, c) and later of Moorea (1989), this fauna would be quite unknown in French Polynesia. His work listed 38 species, most of them being known only from the Society Islands in French Polynesia, including eight endemic species.

Fig. 8. — *Rhynchium quinquecinctum tahitense* de Saussure, 1867 from Taha'a. Photograph: F. Jacq.

The other Psocodea (Phthiraptera Haeckel, 1896 part) are represented by 45 species in French Polynesia, some with mammals as hosts, some with birds as hosts.

The Hymenoptera are represented by 196 species in French Polynesia (Fig. 8) divided into 29 families, with only 65 endemic species. Compared to the Coleoptera (780 species), Diptera (342 species), Hemiptera (415 species) and Lepidoptera (505 species), the Hymenoptera fauna is surprisingly poor in French Polynesia. Even in the absence of evolutionary radiation within the Hymenoptera compared to Coleoptera for example, the number of Hymenoptera species present in French Polynesia is expected to be up to two times higher for the area of land and diversity of habits and hosts. Evolutionary radiation within the Hymenoptera exists in Polynesia, such as the *Hylaeus* Fabricius, 1793 (Colletidae Lepeletier de Saint Fargeau, 1841), *Nesodynerus* Perkins, 1901 (Vespidae Latreille, 1802) or *Sierola* Cameron, 1881 (Bethylidae Dalla Torre, 1898) radiations in Hawaii for example. The Ichneumonidae Latreille, 1802 and Braconidae Nees, 1811 families, which are usually highly diverse families, are only represented in this territory by 17 and 10 species respectively. Recent surveys conducted by the author, Frédéric Jacq & Sylvain Charlat, however, demonstrate previous undersampling of this order resulting in four new families, 20 new species for French Polynesia, and 10 undescribed species (unpublished data; Ramage & Kimsey 2015; Ramage *et al.* 2015a, b, c).

Despite its agricultural interest as an auxiliary insect, the Neuroptera Linnaeus, 1758 of French Polynesia, with its 14 species, have not been studied since the 1930s with the exception of the description of *Austromegalomus insulanus* by Oswald in 1988. The three species of Hemerobiidae Latreille, 1802 are endemic and the only Myrmeleontidae Latreille, 1802 is a pan-Pacific species. Among the 10 Chrysopidae Schneider, 1851, four species are endemic but their status is doubtful as their descriptions are too vague to distinguish them from the other chrysopids of French Polynesia.

With 780 species, the Coleoptera is the most important insect order in terms of species richness in French Polynesia with about 66% of its species being endemic (473 species). Three families among the 45 reported from French Polynesia host 60% of the Coleoptera fauna. These three families are the Curculionidae, with 251 species (211 endemic), the Carabidae with 133 species (112 endemic), and the Staphylinidae with 116 species (69 endemic). The majority of these species belong to large *in situ* radiations.

The Lepidoptera are represented by 505 species in French Polynesia, shared between 380 micro-Heterocera, 105 macro-Heterocera and 20 Rhopalocera. The micro-Heterocera

are dominated by four families represented by 294 species (106 Cosmopterigidae Heinemann & Wocke, 1876, 81 Crambidae Latreille, 1810, 61 Tortricidae Latreille, 1802, and 46 Tineidae Latreille, 1810). This group has been well studied by Clarke for the Austral Islands (1971) and the Marquesas Islands (1986). Its level of endemism is about 80% and is particularly well represented in the Marquesas Islands. The two main groups of macro-Heterocera are the Noctuoidea Latreille, 1809, with 69 species, and the Geometridae Leach, 1815 with 29 species. The Rhopalocera fauna is relatively poor with 20 species, but eight of them are endemic to French Polynesia or Eastern Polynesia.

The Siphonaptera Latreille, 1825 are represented by four species in French Polynesia, all of them being introduced by man.

The Diptera are represented by 342 species in French Polynesia, with 210 (70%) endemic species. These 342 species are distributed into 32 families. Two families host more than 40 species each, the Dolichopodidae Latreille, 1809 with 45 species, 34 of them being endemic, and the Simuliidae Newman, 1834 with 48 species, all endemic.

DISCUSSION

Taxonomic disharmony

The taxonomic disharmony that exists among the terrestrial and freshwater Chelicerata and Hexapoda of French Polynesia is the result of several factors.

The absence of orders such as Grylloblattodea or Mantophasmatodea from French Polynesia is easy to understand, their distribution is restricted to territories far from the South Pacific.

The rarity of perennial streams and wetlands may explain the absence of several aquatic taxa such as the Ephemeroptera, the Trichoptera, the Plecoptera and some aquatic Coleoptera families. These taxa marginally succeeded in colonizing the forest floor in some tropical regions but this colonization did not happen in French Polynesia (Paulian 1998; Polhemus & Englund 2016).

The extreme isolation of French Polynesia, more than 4000 km far from the nearest continent, may explain the absence of some groups. The species most likely dispersed by wind are small or extremely small and families such as the Scarabaeidae for example must have been handicapped by their larger size (Holzapfel & Harrell 1968; Paulian 1998; Roderick & Gillespie 2016).

Austronesian introductions

Another characteristic of the polynesian entomofauna is the difficulty distinguishing native species from those introduced by the Polynesians or Austronesians. Were the pan-Pacific species or polynesian species naturally widespread in the Pacific Islands or were they carried by the Polynesians with food (roots, fruits, animals) or soil (for cultigens reproduced vegetatively) when moving between islands or archipelagos?

The Austronesians, who left from Taiwan and then Indonesia, settled in most of the Pacific Islands as well as in Madagascar (Chaliand *et al.* 1999). Nine ant species reported from French Polynesia present a distribution similar to those of the Austronesians languages (Ramage 2014). It is most likely that these species were carried by the Austronesians from a central location, Indonesia probably. Such a pattern will possibly be discovered for other arthropods groups.

A new momentum

For the past 15 years a new momentum has been instilled with the 2002 Pacific Biological Survey of the Austral Islands, James Liebherr's work on the Carabidae fauna, Neal Evenhuis's work on the Dolichopodidae fauna, Hannelore Hoch's work on the Cixiidae, the Moorea Biocode and Symbiocode projects, and the author's work on the Hymenoptera and Coleoptera fauna.

The first results of the Symbiocode project show that the species richness in the three orders most represented in the sample (Diptera, Lepidoptera and Hymenoptera) is higher than in all earlier reports combined for the Society Islands (Ramage *et al.* 2017).

There are probably still hundreds of undescribed arthropod species in French Polynesia (J. Gourvès, pers. comm.) but the cost of surveys due to the isolation of these archipelgos may explain why only few taxonomists work on this fauna. Most of the publication effort focuses on endemic taxa while there is at least as much work to be done on identifying and listing non-native taxa.

Threats to endemic species

In our modern age of anthropogenic extinctions, islands qualify as "biodiversity hotspots": combining the attributes of high levels of unique biodiversity, of recent species extinctions, and of likely future species losses. Tropical islands are repositories for many of the world's threatened species and indeed are worthy of special attention in conservation prioritization decisions (Whittaker & Fernández-Palacios 2009).

In general, there are four major reasons why island species are reduced by human action: direct predation; the introduction of non-native species; the spread of disease; and habitat degradation or loss (Whittaker & Fernández-Palacios 2009).

French Polynesia is unfortunately known for having one of the highest counts of extinct species worldwide (50 documented species) and about 50 other species on the brink of extinction (Gillespie & Clague 2009).

Although direct predation upon endemic species most likely led to the extinction of several bird species in French Polynesia (Steadman & Pahlavan 1992), Polynesians were not known to feed on or harvest terrestrial arthropods. Therefore, direct predation is unlikely to have contributed to the extinction of endemic insects in French Polynesia. Likewise, the spread of disease is not likely to be involved in the extinction of endemic insects in French Polynesia, although research in this area is lacking.

Both habitat degradation and the introduction of non-native species are the main reasons for the extinction of species in French Polynesia. Already two major waves of native species extinctions have occurred in French Polynesia. Many endemic birds were driven to extinction since Poly-

nesian colonization (1500 years ago) due to overhunting, forest clearance, and the introduction of vertebrates (Pacific rats, dogs, chickens and pigs). The European colonization period, starting about 250 years ago, has led to additional habitat destruction and to the introduction of grazing mammals (goats, sheep, horses, cattle), predators (black rats, cats, ants), and aggressive competitors (e.g. invasive plants) (Gillespie & Clague 2009). This led to the second wave of species extinctions, mostly for endemic birds, plants, and land snails. For 40 years now, French Polynesia has been facing a third wave of extinction. The introduction of the carnivorous snail *Euglandina rosea* (Férussac, 1821) in the 1970s led to the extinction of about 60 endemic tree snail species (*Partula* Férussac, 1821). Four flycatcher species (*Pomarea* Bonaparte, 1854) disappeared because of the recent incursions of the black rat *Rattus rattus* (Linnaeus, 1758), and between 40 and 50 endemic plants are threatened by the massive invasion of the rain and cloud forests by the miconia tree *Miconia calvescens* DC. in Tahiti (Gillespie & Clague 2009). The extinction of native insect species in French Polynesia has not been published yet. However, several species of Coleoptera (Trogossitidae Latreille, 1802, Zopheridae Solier, 1834, Tenebrionidae Latreille, 1802 and Curculionidae) found as subfossils are no longer present in French Polynesia (Nick Porch pers. comm.; Porch & Smith 2017). But the study of subfossils can be effective only if the present fauna is well documented.

To date, the impact of introduced terrestrial and fresh water arthropods on the endemic fauna and flora as well as the impact of both habitat degradation and introduction of non-native species on endemic insect species have not been studied in French Polynesia. It is most likely that introduced pollinators such as syrphid flies or vespid wasps alter the pollination of endemic plants. Or that introduced seed beetles (Bruchinae Latreille, 1802) or other granivorous insects have an impact on endemic plant reproduction. Introduced species such as *Euglandina rosea* and *Miconia calvescens* threatens the recently discovered radiation of land snails (Vertiginidae Fitzinger, 1833) on the summits of Tahiti (Gargominy 2008). The invasion by *M. calvescens* has destroyed most of the remaining natural forests which had escaped deforestation, fires and other degradations (Meyer & Florence 1996; Gargominy 2008) and probably has the same consequences on the *Mecyclothorax* radiation inhabiting the same summits.

52 species (terrestrial flora and fauna) have been declared by the government of French Polynesia to be a threat to local biodiversity. Of these 52 species, only one is a terrestrial arthropod, the Little Fire Ant *Wasmannia auropunctata* (Roger, 1863) (Code de l'Environnement de la Polynésie française 2006; arrêté 1610, CM du 20.X.2016). However, 28 of the 100 world's worst invasive alien species (eight plants, twelve vertebrates and eight invertebrates) are present in French Polynesia, five of which are insects (*Anoplolepis gracilipes* (Smith, 1857), *Bemisia tabaci* (Gennadius, 1889), *Pheidole megacephala* (Fabricius, 1793), *Trogoderma granarium* Everts, 1898 and *Wasmannia auropunctata*) (ISSG 2008).

As a consequence only the management and control of *Wasmannia auropunctata* by the Direction de l'Environnement of French Polynesia (2016), and of *Aedes* Meigen, 1818 species by the Institut Louis Malardé (2016) exist in French Polynesia for now. A few introductions of auxiliaries for pest management purpose have been made recently such as the introduction of *Gonatocerus ashmeadi* Girault, 1915 to control the glassy-winged sharpshooter *Homalodisca vitripennis* (Germar, 1821) (Grandgirard *et al.* 2008).

The rarity or near absence of conservation studies focusing on terrestrial and fresh water arthropods in French Polynesia may in part be explained by the absence of a reference checklist for this fauna. Even recent publications report a much underestimated insect species richness (500 native species in Gillespie & Clague 2009; 1000 species in Gargominy & Bocquet 2013; 1000 species for the Marquesas Islands in Roderick & Gillespie 2016). For now the conservation of endemic insect species in French Polynesia has been impaired due to our lack of knowledge of their taxonomy, distribution, and populations. I hope that the present checklist will help the local actors in environmental management to include both the introduced and native arthropod fauna in their perspectives, including the high proportion of endemic species.

Acknowledgements
This study has been partly funded by the *Société d'Histoire naturelle Alcide-d'Orbigny*, the program *Terres et Mers ultramarines*, the *Société des Amis du Muséum*, the *Société entomologique de France* (Grant Germaine Cousin) and the program *SymbioCode* (ATIP CNRS to Sylvain Charlat). All these structures and programs are thanked for their trust, without them this checklist on the terrestrial and freshwater arthropods of French Polynesia would not exist.

Many thanks to Alexander Anichtchenko, Manfred Asche, Bradley Balukjian, Jérôme Barbut, Charles Bellamy, Patrick Bonneau, James Carpenter, Gerasimos Cassis, Fabio Cassola, Jacques Chassain, Robert Constantin, Michaël Dierkens, Alain Duhamel, Neal Evenhuis, Sergei Golovatch, Yves Gomy, Jiří Háva, Hannelore Hoch, Roman Hołyński, Jan Horák, Sylvain Hugel, Jiří Kolibáč, Fred Jacq, Guillermo Kuschel, Mathieu Lagarde, Marc Lacroix, James Liebherr, Antoine Mantilleri, Jean-Yves Meyer, Vincent Nicolas, Franck Noël, Peter Oboyski, Massimo Olmi, Georges Orhant, Hélène Perrin, Dan Polhemus, Joseph Poupin, David Rider, Jean-Philippe Roguet, Pascal Rousse, Roger Roy, Allan Samuelson, Rudolf Schuh, Emmanuel Séchet, Andrè Skale, Mikael Sörensson, Tim Struyve, Jérôme Sudre, Mick Webb and Tadeusz Zatwarnicki for their contribution to this checklist.

The checklist in available online thanks to Sandrine Tercerie, Claire Régnier, Piotr Daszkiewicz, Olivier Gargominy, Laurent Poncet and Julien Touroult (MNHN). I would also like to thank Jean-François Butaud, Sylvain Charlat, Julien Touroult, Peter Oboyski, and an anonymous reviewer whose suggestions significantly improved the manuscript. And finally many thanks to Ben Warren for his comments on the paper and for correcting English.

REFERENCES

Arrêté 1610 CM du 20 octobre 2016. — http://lexpol.cloud.pf/LexpolAfficheTexte.php?texte=475019

Brûlé S. & Touroult J. 2014. — Insects of French Guiana: a baseline for diversity and taxonomic effort. *ZooKeys* 434: 111-130. https://doi.org/10.3897/zookeys.434.7582

Chaliand G., Jan M. & Rageau J.-P. 1999. — *Atlas historique des migrations*. Editions du Seuil, Paris, 139 p.

Clarke J. F. G. 1971. — The Lepidoptera of Rapa island. *Smithsonian Contributions to Zoology* 56: 1-282.

Clarke J. F. G. 1986. — Pyralidae and Microlepidoptera of the Marquesas Archipelago. *Smithsonian Contributions to Zoology* 416: 1-485. https://doi.org/10.5479/si.00810282.416

Code de l'Environnement de la Polynésie française 2006. http://www.environnement.pf/IMG/pdf/code_env_30-11-06.pdf

Coiffait H. 1976. — Contribution à la connaissance des Staphylinides de Tahiti et des îles Marquises (Coleoptera). *Annales de la Société entomologique de France* 12 (2): 215-245.

Coiffait H. 1977. — Staphylinides nouveaux ou mal connus de Tahiti, des Îles Australes et des Îles Sous-Le-Vent. *Bulletin de la Société d'Histoire naturelle de Toulouse* 113: 170-180.

Coiffait H. 1980. — Les staphylinides des îles de la Société, des îles Marquises et des Îles Australes. *Annales de la Société entomologique de France* 16 (4): 471-500.

Conservation International (online). — Polynesia-Micronesia. http://sp10.conservation.org/where/priority_areas/hotspots/asia-pacific/Polynesia-Micronesia/Pages/default.aspx [accessed on 01/20/2014]

Direction de l'Environnement de Polynésie française 2016. — La petite fourmi de feu. http://www.environnement.pf/la-petite-fourmi-de-feu

Dupon J.-F., Bonvallot J., Vigneron E., Gay J. C., Morhange C., Ollier C., Peugniez G., Reitel B., Yon-Cassat F., Danard M. & Laidet D. 1993. — *Atlas de la Polynésie française*. ORSTOM, Paris, 250 p.

Fairmaire L. M. H. 1849. — Essai sur les Coléoptères de la Polynesie. *Revue et Magasin de Zoologie* 2 (1): 277-291, 352-365, 410-422, 445-460, 504-516, 550-559.

Fairmaire L. M. H. 1850. — Essai sur les Coléoptères de la Polynesie. *Revue et Magasin de Zoologie* 2 (2): 50-64, 115-122, 181-185.

Florence J. & Moretti C. 2006. — Les ressources végétales polynésiennes, *in* Guezennec J., Moretti C. & Simon J.-C. (eds), *Substances naturelles en Polynésie française. Stratégies de valorisation*. IRD Editions, Paris, 340 p.

Gargominy O. 2008. — Beyond the alien invasion: a recently discovered radiation of Nesopupinae (Gastropoda: Pulmonata: Vertiginidae) from the summits of Tahiti (Society Islands, French Polynesia). *Journal of Conchology* 39 (5): 517-536.

Gargominy O. & Bocquet A. 2013. — *Biodiversité d'Outre-mer*. UICN France, Paris et éditions Roger Le Guen – PANACOCO, Beaumont-de-Lomagne. 360 p.

Gargominy O., Tercerie S., Régnier C., Ramage T., Schoelinck C., Dupont P., Vandel E., Daszkiewicz P. & Poncet L. 2016. — *TAXREF v10.0, référentiel taxonomique pour la France: méthodologie, mise en œuvre et diffusion. Rapport SPN 2016–101*. Muséum national d'Histoire naturelle, Paris, 144 p. https://inpn.mnhn.fr/docs-web/docs/download/170253

Gillespie R. G. & Clague D. A. (ed). 2009. — *Encyclopedia of Islands*. Encyclopedias of the Natural World, No. 2. University of California Press, California. 1075 p.

Grandgirard J., Hoddle M. S., Petit J. N., Roderick G. K. & Davies N. 2008. — Engineering an invasion: classical biological control of the glassy-winged sharpshooter, *Homalodisca vitripennis*, by the egg parasitoid *Gonatocerus ashmeadi* in Tahiti and Moorea, French Polynesia. *Biological Invasions* 10: 135-148. https://doi.org/10.1007/s10530-007-9116-y

Groom S. V. C., Stevens M. I., Ramage T. & Schwarz M. P. 2016. — Origins and implications of apid bees (Hymentopera: Apidae) in French Polynesia. *Entomological Science (Early View)*.

Hammer M. 1972. — Investigation on the oribatid fauna of Tahiti, and on some oribatids found on the atoll of Rangiroa. *Det Kongelige Danske Videnskabernes Selskab, Biologiske Skrifter* 19 (3): 1-65.

Hammes C. & Putoa R. 1986. — Catalogue des insectes et acariens d'intérêt agricole en Polynésie française. *Entomologie Agricole, ORSTOM* 2: 259 p.

Hoddle M. S., Hoddle C. D. & Mound L. A. 2008. — Inventory of Thysanoptera Collected from French Polynesia. *Pacific Science* 62 (4): 509-515. https://doi.org/10.2984/1534-6188(2008)62[509:IOTCFF]2.0.CO;2

Holzapfel E. P. & Harrell J. C. 1968. — Transoceanic dispersal studies of insects. *Pacific Insects* 10 (1): 115-153.

Horrocks M., Marra M., Baisden W. T., Flenley J., Feek D., Nualart L. G., Haoa-Cardinali S. & Gorman T. E. 2013. — Pollen, phytoliths, arthropods and high-resolution 14C sampling from Rano Kau, Easter Island: evidence for late Quaternary environments, ant (Formicidae) distributions and human activity. *Journal of Paleolimnology* 50: 417-432. https://doi.org/10.1007/s10933-013-9735-5

Institut Louis Malardé 2016. — Les programmes du LEM. http://www.ilm.pf/ProgrammesLEM

ISSG. 2008. — 100 World's worst invasive alien species. http://www.issg.org/worst100_species.html

Liebherr J. K. 2013. — The *Mecyclothorax* beetles (Coleoptera, Carabidae, Moriomorphini) of Tahiti, Society Islands. *ZooKeys* 322: 1-170. https://doi.org/10.3897/zookeys.322.5492

MacArthur R. H. & Wilson E. O. 1967. — *The Theory of Island Biogeography*. Princeton University Press, Princeton, 203 p.

Meyer J.-Y. & Florence J. 1996. — Tahiti's native flora endangered by the invasion of *Miconia calvescens* DC. (Melastomataceae). *Journal of Biogeography* 23: 775-781. https://doi.org/10.1111/j.1365-2699.1996.tb00038.x

Miller S. E. 1996. — Biogeography of Pacific insects and other terrestrial invertebrates: A status report, *in* Keast A. & Miller S. E., *The Origin and Evolution of Pacific Island Biotas, New Guinea to Eastern Polynesia: Patterns and Processes*. Academic Publishers, Amsterdam: 463-475.

MNHN (online). — Inventaire national du Patrimoine naturel. http://inpn.mnhn.fr [accessed on 12/20/2014]

Munroe E. G. 1996. — Distributional patterns of Lepidoptera in the Pacific Islands, *in* Keast A. & Miller S. E., *The Origin and Evolution of Pacific Island Biotas, New Guinea to Eastern Polynesia: Patterns and Processes*. Academic Publishers, Amsterdam: 275-295.

Nishida G. M. 2009. French Polynesia Checklists. https://essigdb.berkeley.edu/checklists/

Paulay G. 1985. — Adaptative radiation on an isolated oceanic islands: the Cryptorhynchinae (Curculionidae) of Rapa revisited. *Biological Journal of the Linnean Society* 26: 95-187. https://doi.org/10.1111/j.1095-8312.1985.tb01554.x

Paulian R. 1998. — *Les Insectes de Tahiti*. Éditions Boubée, Paris, 331 p.

Perrault G. G. 1977. — La faune des Carabidae de Tahiti. *Nouvelle Revue d'Entomologie* 7 (3): 283-289.

Perrault G. G. 1978. — La faune des Carabidae de Tahiti. II. Genre *Mecyclothorax* (Sharp). *Nouvelle Revue d'Entomologie* 8 (2): 133-162.

Perrault G. G. 1979. — La faune des Carabidae de Tahiti. III. *Mecyclothorax fosbergi* n. sp. *Nouvelle Revue d'Entomologie* 9 (1): 9-10.

Perrault G. G. 1980. — La faune des Carabidae de Tahiti. IV. Nebriini. *Nouvelle Revue d'Entomologie* 10: 29-30.

Perrault G. G. 1982. — La faune des Carabidae de Tahiti, V: le genre *Selenophorus*. *Revue française d'Entomologie, Nouvelle Série* 4 (3): 137-141.

Perrault G. G. 1984. — La faune des Carabidae de Tahiti. VI. Révision du genre *Mecyclothorax* (Sharp) (Psydrini). 1. Le groupe de

M. muriauxi Perrault (Coleoptera). *Nouvelle Revue d'Entomologie, Nouvelle Série* 1 (1): 19-31.

PERRAULT G. G. 1986. — La faune des Carabidae de Tahiti. VII. Révision du genre *Mecyclothorax* (Sharp) (Psydrini). 2. Les groupes de *M. striatopunctatus* n. sp., *M. dannieae* Perrault, *M. marginatus* Perrault et *M. viridis* Perrault (Coleoptera). *Nouvelle Revue d'Entomologie, Nouvelle Série* 3 (4): 439-455.

PERRAULT G. G. 1988. — La faune des Carabidae de Tahiti. VIII. Révision du genre Grylloidea *Mecyclothorax* (Sharp) (Psydrini). 3. Les groupes de *M. altiusculus* Britton et de *M. gourvesi* Perrault (Coleoptera). *Nouvelle Revue d'Entomologie, Nouvelle Série* 5 (3): 229-245.

PERRAULT G. G. 1989. — La faune des Carabidae de Tahiti : IX. Révision du genre *Mecyclothorax* (Sharp) (Psydrini). 4. Le groupe de *M. globosus* Britton (Coleoptera). *Nouvelle Revue d'Entomologie, Nouvelle Série* 6 (1): 57-70.

PERRAULT G. G. 1990. — La faune des Carabidae de Tahiti. X. Le genre *Colpodes* Mec Leay [Coleoptera, Carabidae, Platynini]. *Revue française d'Entomologie, Nouvelle Série* 12 (3): 127-130.

POLHEMUS D. A. & ENGLUND R. A. 2016. — Insectes d'eau douce des îles Marquises, *in* GALZIN R., DURON S.-D. & MEYER J.-Y. (eds), *Biodiversité terrestre et marine des îles Marquises, Polynésie française*. Société française d'Ichtyologie, Paris, 526 p.

PORCH N. & SMITH T. R. 2017. — New *Pycnomerus* Erichson (Coleoptera: Zopheridae: Pycnomerini) from Rimatara, French Polynesia. *Zootaxa* 4237 (1): 154-166. http://doi.org/10.11646/zootaxa.4237.1.8

RAGEAU J. 1959. — *Rapport sur une mission d'entomologie médicale & vétérinaire en Polynésie française (Juin-Juillet 1959)*. ORSTOM, Paris, 41 p.

RAMAGE T. 2014. — Les Fourmis de Polynésie française (Hymenoptera, Formicidae). *Bulletin de la Société entomologique de France* 119 (2): 145-176.

RAMAGE T. & DUHAMEL A. 2015. — Une nouvelle espèce de *Rhyncogonus* Sharp, 1885, de Polynésie française et un nouveau statut pour *Psomeles luctuosus* Guérin-Méneville, 1838 (Coleoptera, Curculionidae, Entiminae). *Bulletin de la Société entomologique de France* 120 (4): 457-463.

RAMAGE T., CHARLAT S. & JACQ F. 2015a. — The Aculeata of French Polynesia. III. Sphecidae, with the record of three new species for the Society Islands (Hymenoptera). *Bulletin de la Société entomologique de France* 120 (2): 157-163.

RAMAGE T., GRANDGIRARD J. & DURAND F. 2015b. — The Aculeata of French Polynesia. I. First record of a Pompilid wasp (Hymenoptera, Pompilidae). *Bulletin de la Société entomologique de France* 120 (1): 15-18.

RAMAGE T., GRANDGIRARD J. & SCHULTEN G. G. M. 2015c. — The Aculeata of French Polynesia. II. First record of *Micromeriella marginella modesta* from Society Islands and Vanuatu (Hymenoptera, Scoliidae, Campsomerini). *Bulletin de la Société entomologique de France* 120 (1): 87-90.

RAMAGE T. & KIMSEY L. S. 2015. — The Aculeata of French Polynesia. IV. First record of *Chrysis angolensis* (Hymenoptera, Chrysididae). *Bulletin de la Société entomologique de France* 120 (2): 209-211.

RAMAGE T., MARTINS-SIMOES P., MIALDEA G., ALLEMAND R., DUPLOUY A., ROUSSE P., DAVIES N., RODERICK G. K. & CHARLAT S. 2017. — A DNA barcode-based survey of terrestrial arthropods in the Society Islands of French Polynesia: host diversity within the SymbioCode Project. *European Journal of Taxonomy* 272. https://doi.org/10.5852/ejt.2017.272.

RODERICK G. K. & GILLESPIE R. G. 2016. — Arthropodes terrestres des îles Marquises: diversité et évolution, *in* GALZIN R., DURON S.-D. & MEYER J.-Y. (eds), *Biodiversité terrestre et marine des îles Marquises, Polynésie française*. Société française d'Ichtyologie, Paris, 526 p.

STEADMAN D. W. & PAHLAVAN D. S. 1992. — Extinction and Biogeography of Birds on Huahine, Society Islands, French Polynesia. *Geoarchaeology* 7 (5): 449-483. https://doi.org/10.1002/gea.3340070503

THORNTON I. W. B. 1981a. — Psocoptera of the Fiji Islands. *Pacific Insects Monograph* 37: 1-105.

THORNTON I. W. B. 1981b. — Psocoptera of the Tongan Archipelago. *Pacific Insects Monograph* 37: 106-135.

THORNTON I. W. B. 1981c. — The Psocoptera of the Hawaiian Islands. Parts I and II. Introduction and The Nonendemic Fauna. *Pacific Insects* 23 (1-2): 1-49.

THORNTON I. W. B. 1989. — Psocoptera (Insecta) of the island of Moorea, French Polynesia, and comparisons with other Pacific island faunas. *Bulletin du Museum national d'Histoire naturelle* 4e série, section A, 11 (4): 783-828.

WHITTAKER R. J. & FERNÁNDEZ-PALACIOS J. M. 2009. — *Island Biogeography. Ecology, evolution, and conservation. Second Edition*. Oxford University Press, Oxford, 401 p.

Submitted on 22nd September 2015;
accepted on 26 January 2017;
published on 30 June 2017.