

## Two new *Opodiphthera* species from Bougainville and Guadalcanal (Solomon archipelago) (Lepidoptera: Saturniidae, Saturniinae)

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**Abstract:** Two new species of the genus *Opodiphthera*, belonging to the *sciron*-group of species, are described: *Opodiphthera decellei* LEMAIRE & NÄSSIG, 2002 sp. n. (holotype ♂ in Paris) from Bougainville island (Buin; Papua Niugini) and *O. tennenti* NÄSSIG & LEMAIRE, 2002 sp. n. (holotype ♂ in London) from Guadalcanal island (Babadeha village; Solomon Islands). *O. decellei* sp. n. is known in both sexes and shows only a minor form of sexual dimorphism; the female is dark orangy brown (not uniformly greyish as most other species of the group). This character and the cocoon known (which is evidently a single cocoon and not part of a big communal cocoon) indicate that *O. decellei* most likely is quite basal in the *sciron*-group. *O. tennenti* sp. n. is only known in the male sex, but it might be expected that sexual dimorphism will also be small in this species. These two species are the easternmost “outliers” of the Saturniidae of the Australian biogeographical region known today.

### Zwei neue *Opodiphthera*-Arten von Bougainville und Guadalcanal (Salomonen-Archipel) (Lepidoptera: Saturniidae, Saturniinae)

**Zusammenfassung:** Zwei neue Arten der Gattung *Opodiphthera* (aus der *sciron*-Artengruppe) werden beschrieben: *Opodiphthera decellei* LEMAIRE & NÄSSIG, 2002 sp. n. (Holotypus ♂ in Paris) von der Insel Bougainville (Buin; Papua-Neuguinea) und *O. tennenti* NÄSSIG & LEMAIRE, 2002 sp. n. (Holotypus ♂ in London) von der Insel Guadalcanal (Ort Babadeha; Salomonen). Die neue Art *O. decellei* ist in beiden Geschlechtern bekannt; sie zeigen nur eine geringe Ausprägung des Sexualdimorphismus, die Weibchen sind dunkel orangebraun wie die Männchen (im Gegensatz zu den meisten anderen Arten, bei denen die ♀♀ einfarbig gräulich sind). Diese Merkmalsausbildung sowie der einzig bekannte Kokon (der offenbar ein Einzelkokon ist und kein Teil eines Gemeinschaftskokons) lassen vermuten, daß *O. decellei* höchstwahrscheinlich eine basal stehende Art innerhalb der *sciron*-Gruppe ist. Von *O. tennenti* sp. n. ist nur das Männchen bekannt, aber man kann erwarten, daß auch in dieser Art der Sexualdimorphismus nicht besonders groß ist. Diese zwei Arten sind nach heutiger Kenntnis die östlichsten Vertreter der Familie Saturniidae in der Australischen Faunenregion.

### Déscription de deux espèces inédites du genre *Opodiphthera* originaires de Bougainville et Guadalcanal (Îles Salomon) (Lepidoptera: Saturniidae, Saturniinae)

**Résumé:** Deux espèces inédites du genre *Opodiphthera*, appartenant au groupe d'*O. sciron*: *Opodiphthera decellei* LEMAIRE & NÄSSIG, 2002 sp. n. (holotype ♂ in MNHN, Paris) et *O. tennenti* NÄSSIG & LEMAIRE, 2002 sp. n. (holotype ♂ in NHM, précédemment BMNH, London) sont décrites des Îles Salomon, îles de Bougainville (Buin; Nouvelle Guinée-Papua) et Guadalcanal (village de Babadeha) respective-

ment. *O. decellei*, dont les deux sexes sont connus est peu sexuellement dimorphique et la femelle est brune orangé foncé, alors que la plupart de celles du groupe-espèce sont uniformément grises. Ce caractère, du même que la structure du cocon (brun et compact), font partie intégrante du plan de base du groupe d'*O. sciron*. Le mâle d'*O. tennenti* est seul connu mais le dimorphisme sexuel de l'espèce est aussi probablement réduit. Les deux espèces nouvelles sont les Saturniidae les plus orientaux de la région biogéographique australienne actuellement connus.

### Introduction

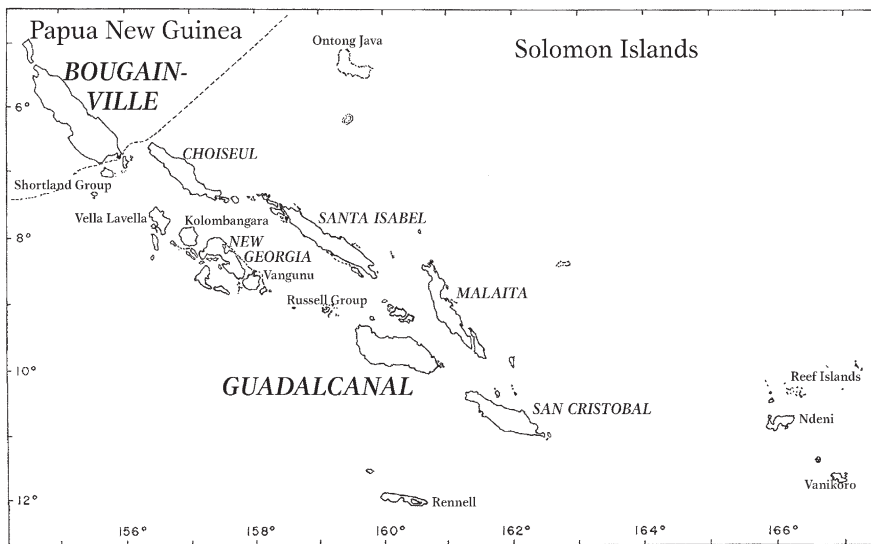
The Saturniidae of the Australian zoogeographical region (i.e., Australia, New Guinea and surrounding smaller islands on the shelf of the Australian plate and closely adjacent to it) are still somewhat enigmatic, and their relationships require further study; but there are three main groups of species:

1. The Attacini with a few species each of the genera *Attacus* LINNAEUS, 1767 and *Coscinocera* BUTLER, 1879 (see, e.g., PEIGLER 1989). These two genera are closely related, but their phylogenetic relationships in detail require further research.
2. The genus *Pararhodia* COCKERELL, 1914 of unclear affinities. It is at present tentatively placed in the tribe Saturniini, which in its present limits possibly may be a paraphyletic entity. There is a possibility that *Pararhodia* may belong to following group, but it has also been suggested that it may be closely related to the genus *Lemaireia* NÄSSIG & HOLLOWAY, 1987 from SE Asia, and a phylogenetic analysis is still lacking.
3. An endemic, surely monophyletic Saturniini group restricted to the Australian-Papuan region, consisting of the relatively homogenous genus *Syntherata* MAASSEN, [1873] and the heterogenous species of *Opodiphthera* WALLENGREN, 1858, by some authors further subdivided into *Opodiphthera*, *Neodiphthera* FLETCHER, 1982 and *Austrocaligula* COCKERELL, 1914, based on merely typological evidence.

This third, endemically Australian group of genera (the *Opodiphthera*-group of genera, as this evidently monophyletic group shall be named here according to the oldest generic name included) is defined by a great uniformity in ♂ genitalia morphology: The valves are relatively small and triangular, with a pointed tip; the uncus is bilobed, usually long, often humped; the aedeagus is slightly asymmetrical, with a sclerotized pointed tip

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**Map 1:** Map of the Solomon islands, with larger islands only named. The northwestern part (Bougainville) politically belongs to Papua Niugini, while the other islands form an independent state. *Opodiphthera* species are known from Bougainville (*O. decellei* sp. n.) and Guadalcanal (*O. tennenti* sp. n.) thus far. — After TENNENT (1999b), modified.

(sometimes spine-like) opposite to a membraneous, unsclerotized part; the vesica is usually without sclerotisations; and there is, as the perhaps best defining synapomorphy of this group, a special, moveable protuberance between the dorsal articulation of the valves and the uncus, which often has a complicated shape. This protuberance may possibly be a transformation of the transtilla similar to (but clearly distinct from) the labides of the genus *Antheraea* HÜBNER, [1819] (see LEMAIRE 1978, NÄSSIG 1991, NÄSSIG et al. 1996, NÄSSIG & TREADAWAY 1998). Whether this complex organ is a synapomorphy of *Antheraea* and the *Opodiphthera*-group requires further study.

In the West of the Australian region four different species are presently known as the westernmost outlying members of the *Opodiphthera*-group: Two species of the genus *Syntherata* (from Ambon, Seram and Buru: *S. innescens* NAUMANN & BRECHLIN, 2001; from Halmahera: *S. sinjaevi* NAUMANN & BRECHLIN, 2001), one of the *astrophela*-group of *Opodiphthera* (from Tenimber: *O. tenimberensis* NIEPELT, 1934), and one of the *sciron*-group of *Opodiphthera* (from Seram and Ambon: *O. ceramensis* BOUVIER, 1928).

However, in the East only one group of species is known to reach beyond the continental shelf of New Guinea, New Britain and New Ireland with two undescribed species. These species are found on two different islands of the Solomon islands archipelago: Bougainville (politically a part of Papua Niugini) and Guadalcanal (a part of the independent state of the Solomon Islands) (see Map 1).

These two new species belong to a group of (as far as both sexes are known) in general sexually dimorphic species, with the ♂♂ in different colours of brown, with usually a clear pattern, ♀♀ of most species in a rather uniform greyish colour with only a reduced, weak pattern, of the genus *Opodiphthera*. As far as known (only of a very few species) the larvae are at least in some cases fully gregarious and spin communal cocoons within a single envelope (see COMMON 1990: 406, for *O.*

*saccopoea* (TURNER, 1924) from Australia). This group is called here the **sciron-group** based on the oldest taxon included, *Saturnia sciron* WESTWOOD, 1881. There are about 5–10 species in the *sciron*-group, and most of them are externally very similar. This species-group requires a revision perhaps more desperately than any other group of the genus *Opodiphthera*. However, the two species described here are sufficiently distinct in morphology and, further, geographically so much isolated that the description is fully justified.

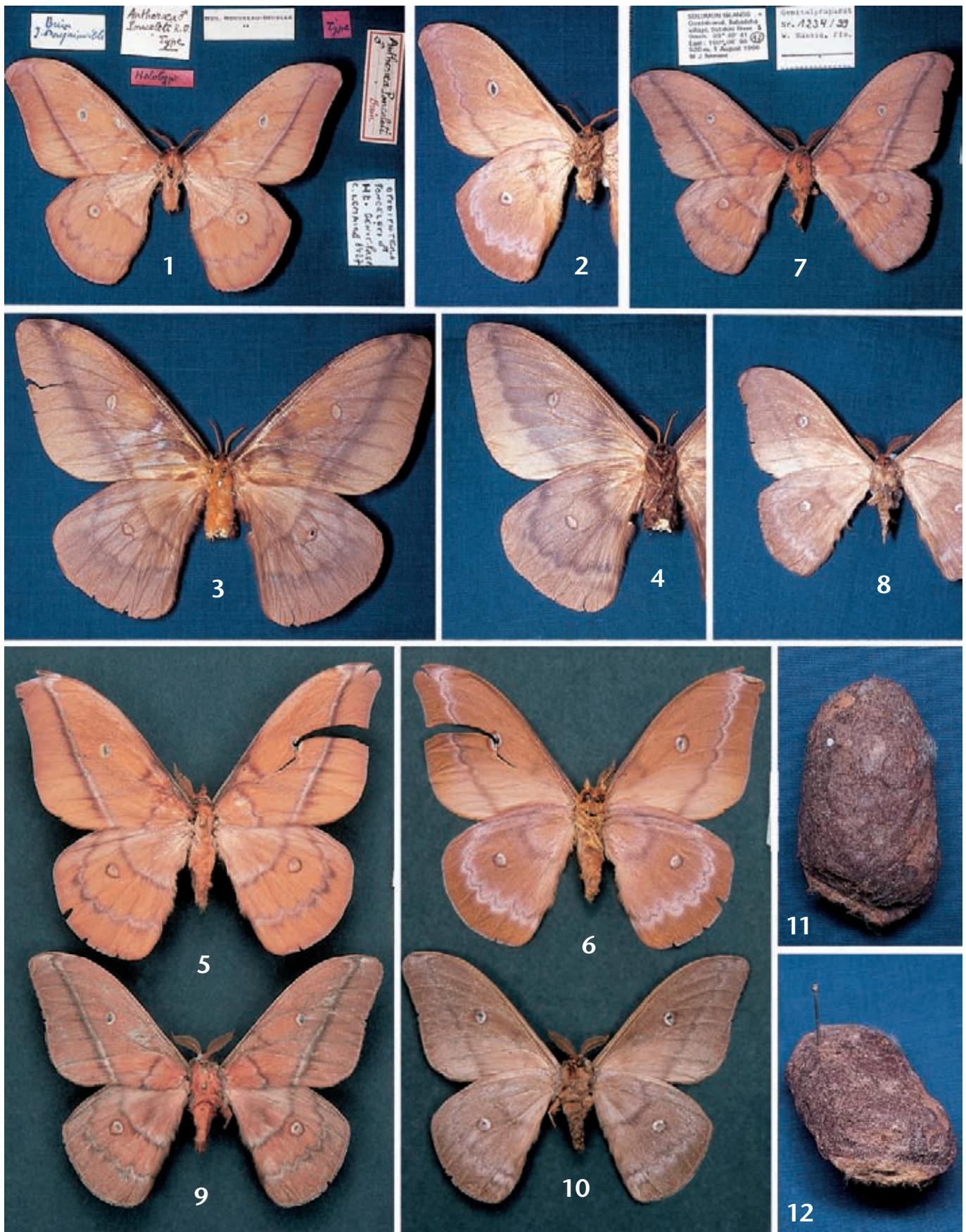
Interestingly, these two “outliers” in the East belong to the same group as *O. ceramensis* from Seram and Ambon in the West, which means that the *sciron*-group of species is probably more widespread at the limits of the Australian region than any other species-group of *Opodiphthera* and *Syntherata*.

These two species are described here as follows:

#### *Opodiphthera decellei* LEMAIRE & NÄSSIG, sp. n.

**Holotype** [HT]: ♂, “Buin, I[le] Bougainville”, “*Antheraea Ponceleti* R.D. Type”, “Holotype”, “Mus. ROUSSEAU-DECELLE”, “*Antheraea Ponceleti* ♂ Buin | Type”, “*Opodiphthera ponceleti* ♂ Ht. Genit. Prep C. LEMAIRE 6427”, in coll. C. LEMAIRE in Muséum national d’Histoire naturelle (MNHN) in Paris, France. — Figs. 1, 2.

**Paratypes** [PT] (in total 2 ♂♂, 2 ♀♀): 1 ♀ (allotype [AT], Figs. 3, 4), “*Saturniide ponceleti* ♀ sp. n. Bougainville”, “*Antheraea* ♀ *Ponceleti* R.D. Allotype”, “Allotype”, “Mus. ROUSSEAU-DECELLE”, “*Antheraea Ponceleti* ♀ Buin | Type”, “*Opodiphthera ponceleti* ♀ Pt. Genit. Prep C. LEMAIRE 6428”, in coll. C. LEMAIRE in MNHN, Paris, France. — 1 ♂, “*ponceleti* ♂ Bougainville”, “*Antheraea* ♂ *Ponceleti* R.D. Paratype”, “Paratype”, “Mus. ROUSSEAU-DECELLE”, “*Antheraea Ponceleti* ♂ Buin | Cotype”, “Genit. ♂ Prep. C. LEMAIRE N. 3457”, “*Opodiphthera decellei* ♂, HT Genit Prep. C. LEMAIRE 3457”. — 1 ♀, “Buin, I[le] Bougainville”, “*Antheraea* ♀ *Ponceleti* R.D. Paratype”, “Paratype”, “Mus. ROUSSEAU-DECELLE”, “*Antheraea Ponceleti* ♀ Buin | Type”. — This ♂♀ ex coll. C. LEMAIRE in Forschungsinstitut Senckenberg, Frankfurt am Main, Germany (SMFL). — 1 ♂, Papua Niugini, N. Salomonen, Bougainville, Buin, 500 ft., [from STRAATMAN,] GP 1233/99, ex coll. C. G. TREADAWAY, in CWAN in SMFL (Figs. 5, 6). — New holo- and paratype labels with the correct name will be added.



**Colour plate:** Fig. 1–6: *Opodiphthera decellei* sp. n. — Fig. 1: holotype ♂ (in MNHN), upperside, length of forewing (lfw, right side) = 52 mm. Fig. 2: dto., underside. Fig. 3: paratype ♀ (allotype, in MNHN), upperside, lfw = 59 mm. Fig. 4: dto., underside. Fig. 5: paratype ♂ (in SMFL), upperside, lfw = 51 mm. Fig. 6: dto., underside. — Figs. 7–10: *Opodiphthera tennenti* sp. n. — Fig. 7: paratype ♂ (in SMFL), upperside, lfw = 45 mm. Fig. 8: dto., underside. Fig. 9: holotype ♂ (in BMNH), upperside, lfw = 47 mm. Fig. 10: dto., underside. — Figs. 11/12: cocoon of (most likely) *Opodiphthera decellei* sp. n. (in MNHN). Fig. 11: dorsal view, with the hatching opening in the lower left corner. Fig. 12: view on the hatching slit. — Photographs 5/6 & 9/10 U. BROSCHE, Hille; other photographs W. A. NÄSSIG.

**Further material** (no paratype material): One empty cocoon accompanying the four specimens in the ROUSSEAU-DECELLE collection and most likely belonging to these specimens, without labels, now deposited together with the holo- and allotype in coll. C. LEMAIRE in MNHN, Paris (will receive a label correspondingly). — Figs. 11, 12.

**Etymology:** The new species is named after Georges ROUSSEAU-DECELLE, from whose collection the first specimens of this new species were received by one of the authors (C.L.) in the mid-1960ies. The two pairs in coll. ROUSSEAU-DECELLE were collected by Reverend Father PONCELET on Bougainville and were already identified as an undescribed species, which G. ROUSSEAU-DECELLE intended to describe as "*Anthe-raea ponceleti* n. sp.". However, when the specimens were eventually donated to C.L. after the death of G. ROUSSEAU-DECELLE, it was decided to name it after him.

### Description and diagnosis

♂ (Figs. 1&2, 5&6). Length of forewing (right wing measured) (lfw): 51/52/55 mm, i.e. one of the larger species of the *sciron*-group. General view as usual in the *sciron*-group, but: Ground colour of wings orangy brown; the outer part of the median field is much less greyish suffused than in other species, which makes this orangy brown a quite vivid colouration. As well, the veins in the antemarginal field are less intensively darkened in the colour of the postdiscal fascia than in other species. Forewing (fw) eyespots much less distinctly coloured than in other species; the distal lunule is yellow and the proximal one pinkish without distinct rings as in other species; nearly no external dark border around the eyespot. The hindwing (hw) eyespots are as well less distinctly coloured than in other species.

♂ **genitalia** (Figs. 13a–e). In total comparatively small for such a big species. The small aedeagus does not have a spiny tip; the apex of the aedeagus shaft, which is situated dorsally, is rounded and weakly sclerotized. The uncus is relatively long, proximally on the dorsal side humped, the base towards the tegumen not fully fused medially, the bifid distal tip relatively narrow. Sacculus only a tiny tip medially (Fig. 13b, white arrow). The valves are a little larger than in the following species and show a slightly different curve on the distoventral edge (compare Figs. 13a and 15a).

♀ (Figs. 3&4). Lfw: 59/60 mm. Ground colour of wings not greyish brown as in most other species, but orangy brown, however, strongly suffused and darker than in ♂♂. While the general colouration is more vivid than in other species' ♀♀, the fw and hw eyespots are less clearly marked and indistinct (similar to the ♂♂). The body is clearly orangy to reddish brown, not greyish as in other species.

♀ **genitalia** (Fig. 14). Bursa copulatrix small, not sclerotized. The whole apparatus is comparatively simple and not many characters are available at all.

The **preimaginal stages** and the **life-history** are unknown.

There was only one **cocoon** without labelling accompanying the two pairs in the ROUSSEAU-DECELLE collection

(Figs. 11/12) which most likely belongs to *O. decellei*: This cocoon evidently is a single cocoon (i.e., not part of a communal cocoon under one communal "envelope") and to a large degree resembles the cocoon of *Opodiphthera eucalypti* (SCOTT, 1864) or *O. helena* (WHITE, 1843). The wall is relatively stiff and hard. The outer silk is coarse and dense and evidently was spun into rotten tree bark or a similar medium; the outer wall is dark maroon-coloured. The opening from which the moth eclosed is slit-shaped; there was evidently no preformed valve-like opening, but the way out was cut with the spines on the basal wing sclerites of the moth after a softening of the tissue by fluid from the mouth.

### Discussion

In contrast to other species of the *sciron*-group of the genus *Opodiphthera*, for which this is known, the ♀♀ of *O. decellei* are dark orangy brown and still retain much of the wing pattern and of the different colouration of the eyespots. Those other species from Australia, New Guinea and surrounding islands usually have ♀♀ which are more or less uniform greyish brown or greyish in colour, with most of the pattern reduced. Secondly, the cocoon appears to be spun singly, not in a communal "envelope". These two characters can perhaps most easily be explained as plesiomorphic characters of *O. decellei*, placing this species probably close to the phylogenetic basis of the *sciron*-group.

### *Opodiphthera tennentii* NÄSSIG & LEMAIRE, sp. n.

**Holotype:** ♂, Solomon Islands, Guadalcanal, Babadeha village, Sutakiki River, South: 09° 40' 41, East: 160° 06' 90, [collecting code:] S12, 520 m, 1 August 1996, W J TENNENT. Dissection no. BMNH Sat 686 (= GP 1568/02 W. NÄSSIG). In The Natural History Museum (formerly British Museum (Natural History), BMNH), London. — Figs. 9, 10.

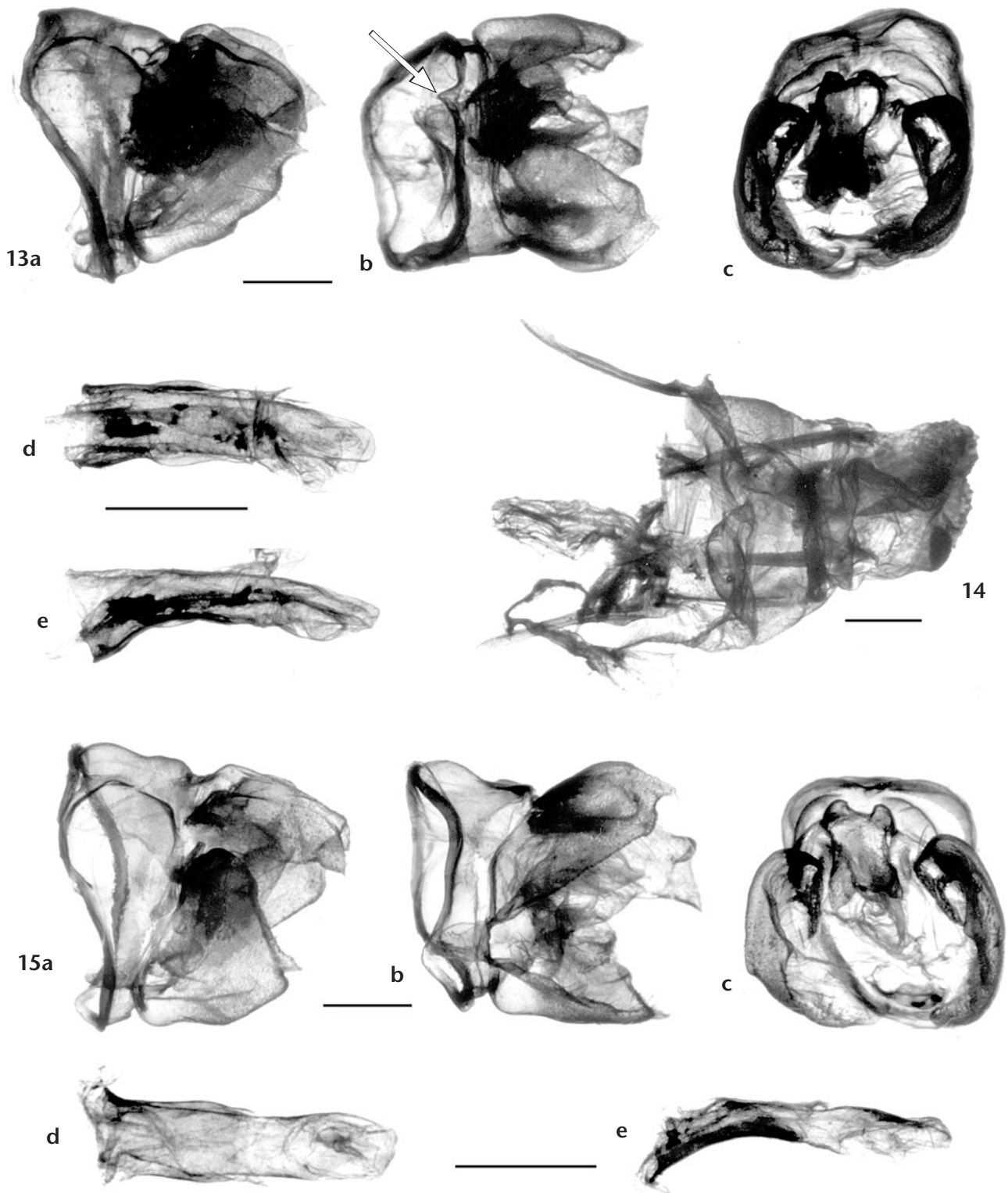
**Paratype:** 1 ♂, same data as HT. GP 1234/99. In SMFL, Frankfurt am Main. — Figs. 7, 8.

**Etymology:** The new species is named after its collector, W. John TENNENT, who in x. 1996 kindly loaned the two specimens to the Senckenberg-Museum for study and donated the PT to SMFL.

### Description and diagnosis

♂ (Figs. 7–10). Lfw: 45/47 mm, i.e. one of the smaller species of the *sciron*-group. The ground colour is much darker than in most other species. Compared with *O. decellei* sp. n., the colouration is of a dark reddish-orange brown, but the general aspect of the specimens is similar to this species from Bougainville in being much less intensively suffused with greyish scales than other taxa, and the indistinct colouration of the fw and hw eyespots is also more similar to *O. decellei* than to other species. The fw and hw eyespots are nearly without yellow.

♂ **genitalia** (Figs. 15a–e). The genitalia are similar to those of *O. decellei* sp. n. Differences are found in the uncus (the bifid distal tip is slightly broader in *O. tennentii*), the sacculus (much broader in *tennenti*) and somehow in the shape of the valves and of the protuber-



**Figs. 13–15:** Genitalia of two new *Opodiphthera* species. **Fig. 13:** *O. decellei* sp. n., ♂, HT, dissection no. 6427 LEMAIRE, in MNHN, Paris; stained with red colour, therefore appearing darker in the pictures. **a** = (dorso-)lateral view; **b** = ventral view (white arrow indicates the tiny sacculus); **c** = caudal view. **d** & **e** = aedeagus, further enlarged: **d** = dorsal view; **e** = lateral view. — **Fig. 14:** *O. decellei* sp. n., ♀, PT (AT), dissection no. 6428 LEMAIRE, in MNHN, Paris; stained, therefore appearing darker. Ventral view. — **Fig. 15:** *O. tennenti* sp. n., ♂, HT, dissection no. BMNH Sat 686 (= GP 1568/02 W. NÄSSIG), in BMNH, London; not stained. This will later be embedded in Euparal. **a** = (dorso-)lateral view; **b** = ventral view (the sacculus is much broader than in *O. decellei*); **c** = caudal view. **d** & **e** = aedeagus, further enlarged, **d** = dorsal view; **e** = lateral view. — The photographs were taken from genitalia freely floating in fluid (ethanol) with an Olympus binocular microscope SZH-10, photographic tube and Olympus OM-2 camera on Ilford Pan F film. Photographs and digital finishing with software Photoshop by W. A. NÄSSIG. — Scale 1 mm each.

ances at the dorsal base of the valves. Also, the valves are slightly smaller in *tennenti*.

The female, the preimaginal stages and the life-history are unknown. Seen in comparison to *decellei* sp. n. it may

perhaps be expected that the sexual dimorphism might even be less prominently developed than in that species.

The collector, John TENNENT, described the collecting locality of the two specimens in a letter dated 15th

November, 1996: “The locality was by the side of a river at c. 500 m, in a deep valley with very steep slopes rising to 1200 m+ on each side. Although the trap was run in a village garden, cultivation was minimal and the spot was surrounded by largely undisturbed forest.” During later visits on Guadalcanal with many collecting attempts at light at the same and at other localities, no further specimens of this species were found by John TENNENT.

## Discussion

The island of Guadalcanal is, according to present knowledge, the easternmost locality for any autochthonous Saturniidae species on the southern hemisphere; no other species is known further away eastwards from the Australian continental shelf into the Pacific Ocean. (The Australian species *Opodiphthera eucalypti* was introduced by man into New Zealand, but this area does not belong to the autochthonous distribution range of the species.) However, it may perhaps be expected that the *sciron*-group of the genus *Opodiphthera* might possibly also have reached the large eastern island San Cristobal of the Solomons (for notes on the zoogeography of the Solomons, see, e.g., TENNENT 1999a, 1999b, 2000, 2002, TENNENT & KITCHING 1998). These *Opodiphthera* species appear to be quite rare on the Solomon islands, and as long as their ecology and life-history (including seasonal flight patterns, preferred habitats and larval foodplants) are unknown, any encountering of the species during collecting nights at light is purely by chance.

No autochthonous Saturniidae have been found during more or less extensive light collecting studies on Rennell Island (FLETCHER 1959), New Caledonia (HOLLOWAY 1979), Norfolk Island (HOLLOWAY 1977), or Fiji (there only one introduced ♂ of *Opodiphthera eucalypti* was found on Vanua Levu: ROBINSON 1975: 309), or on any other Pacific island.

As the ♀ and the preimaginal instars of *O. tennenti* are still unknown, the value of the characters “female habitus” and “cocoon spun singly or communal” for phylogenetic reasoning is still unknown today.

Although *O. decellei* is perhaps the most vividly coloured species and *O. tennenti* one of the most dark brownish species of the *sciron*-group, they both share several probably derived characters in their wing pattern and possibly also genitalia morphology and might well be closely related (which would also be supported by the biogeographical circumstances). Both species somewhat stand out in external morphology within the *sciron*-group.

## Acknowledgements

Special thanks to W. John TENNENT, who allowed the study on his specimens and kindly donated the paratype to Senckenberg. A specimen of *Opodiphthera decellei* was received from Raymond STRAATMAN by Colin G. “Trig” TREADAWAY and kindly donated to the senior author. Ulrich BROSCHE most kindly used his elaborate photogra-

phic equipment and produced the illustrations nos. 5/6 & 9/10.

The junior author wishes to thank the heirs of the regretted Georges ROUSSEAU-DECELLE, especially Mr and Mrs DONNODIEN, for the gift of the four specimens hereby designated as the holotype and paratypes of *O. decellei*.

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