New and rare water mites from New Caledonia (Acari: Hydrachnidia)
Smit, H.

Published in:
Zoologica Neocaledonica 7: Biodiversity studies in New Caledonia

Citation for published version (APA):

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
New and rare water mites from New Caledonia
(Acari: Hydrachnidia)

Harry SMIT
Zoological Museum, University of Amsterdam, Plantage Middenlaan 64, 1018 DH Amsterdam, The Netherlands
smit.h@wolmail.nl

ABSTRACT
Examinations of water mites collected in New Caledonia between 1996 and 2005 resulted in 13 species new to science: Javathyas neocaledonicus n. sp., Frontipoda mouensis n. sp., F. purpurea n. sp., Aspidiobates brevipes n. sp., A. convexus n. sp., A. denticulatus n. sp., A. longisetus n. sp., A. simplipalpis n. sp., A. villosus n. sp., Caledoniabates asper n. sp., Gondwanabates neocaledonicus n. sp., Recifella stygophila n. sp. and Nudomideopsis maryae n. sp. The male of Aspidiobates rarus Smit and the female of A. minutus Smit are described for the first time, while a redescription is given for the male of A. minutus Smit. A key is presented for all New Caledonian Aspidiobates species. The males of Koenikea solitaria Smit and Arrenurus expansipalpis (Smit) n. comb. are described for the first time. Diplodontus haliki Lundblad is reported for the first time from New Caledonia.

RÉSUMÉ
Acariens nouveaux et rares de Nouvelle-Calédonie (Acari : Hydrachnidia).
L’étude des acariens aquatiques collectés en Nouvelle-Calédonie entre 1996 et 2005 a permis de découvrir 13 espèces nouvelles pour la science: Javathyas neocaledonicus n. sp., Frontipoda mouensis n. sp., F. purpurea n. sp., Aspidiobates brevipes n. sp., A. convexus n. sp., A. denticulatus n. sp., A. longisetus n. sp., A. simplipalpis n. sp., A. villosus n. sp., Caledoniabates asper n. sp., Gondwanabates neocaledonicus n. sp., Recifella stygophila n. sp. et Nudomideopsis maryae n. sp. Le mâle de Aspidiobates rarus Smit et la femelle de A. minutus Smit sont décrits pour la première fois, tandis que le mâle de A. minutus Smit est décrit à nouveau. Une clé est fournie pour toutes les espèces néo-calédoniennes de Aspidiobates. Les mâles de Koenikea solitaria Smit et Arrenurus expansipalpis (Smit) n. comb. sont décrits pour la première fois. Diplodontus haliki Lundblad est cité pour la première fois de Nouvelle-Calédonie.
INTRODUCTION

In New Caledonia Aspidiobates Lundblad is the most dominant genus of water mites, both in species and in numbers. It has undergone an extensive species radiation (K. O. Viets 1969; Smit 2002). Worldwide, most Aspidiobates species are known from New Caledonia. Together with the new species described in this paper, New Caledonia harbours 19 species, while Australia has eight species. Furthermore, one new species of Gondwanabates is described in this paper, a genus with a predominantly Australian distribution. Therefore one can conclude that the New Caledonian and Australian water mite fauna are much related to each other. Nevertheless, the origin of the New Caledonian water mite fauna is more complex, as elements of the New Zealand water mite fauna and even of the Asian water mite fauna are described in this paper.

Thus far, only three papers have been published on the New Caledonian water mite fauna, i.e. Walter (1915), K. O. Viets (1969) and Smit (2002). In this paper new species collected by me in 2005 and by Nathalie Mary (Corneilla del Vercol, France) in the period 1996-2005 are described. Moreover, new records are given of rare species. Members of the genus Hydrodroma Koch have been described in a separate paper (Pesic & Smit 2007).

MATERIALS AND METHODS

Water mites were collected by hand netting, sorted in the field from living material and preserved in Koenike’s fluid. The material of N. Mary was fixed in ethanol. At one location hyporheic water mites were collected with a pump as described by Boulton et al. (1992). This is an adapted Bou-Rouch pump, but much lighter, and therefore easier to use in the field. Holotypes and paratypes have been deposited in the Muséum national d’Histoire naturelle, Paris (MNHN), paratypes and all non-type material in the Zoological Museum of the University of Amsterdam (ZMAN).

Coordinates were estimated with a GPS. Abbreviations used: PI-PV palp segments 1-5; IV-leg-4-6 fourth-sixth segments of fourth leg. Measurements are given in µm.

SYSTEMATIC ACCOUNT

Family HYDRYPHANTIDAE Piersig

**Genus DIPLODONTUS** Dugès, 1834

*Diplodontus* Dugès, 1834: 148.
*Diplodontus haliki* Lundblad, 1947


REMARKS. – This is the first record of the genus for New Caledonia. The females vary considerably in size, and are 884-1367 in length and 648-1105 in width. The chelicera of the largest females is 583 long. *Diplodontus haliki* is widespread in Australia, and also found in New Guinea (Wiles 1997).

**Genus JAVATHYAS** Viets, 1929

**Javathyas neocaledonicus** n. sp.

Figs 1-4


DIAGNOSIS. — Female anteromedial dorsal plate quadratic, two central medial dorsal plates elongated.

DESCRIPTION. — Female: Idiosoma 1012 long and 770 wide. Anteromedial plate quadratic, 311 long and 335 wide, bearing postocularia; no medial eye visible. Dorsum with four pairs of lateral plates and two mediocentral, elongated plates. Anterior of the mediocentral plates 229 long and 128 wide, posterior mediocentral plate 296 long and 189 wide. Coxal plates in four groups. Medial margins of first coxal plates with numerous feathered setae. Tips of first coxal plates each with a group of five feathered setae. Lateral margins of fourth coxal plates with four feathered setae. Capitulum 332 long. Genital field with three pairs of large acetabula, located between third and fourth coxal plates. Anterior and posterior acetabula large, anterior acetabula 75 in diameter, posterior acetabula 60 in diameter; central acetabula elongated. Genital flaps covering only middle pair of acetabula, with two pairs of heavy setae. A well developed genital sclerite present. Ventrum posteriorly with two pairs of plates. Lengths of PI-PV: 40, 95, 54, 130, 38. PIV anteroventrally with two setae. Lengths of I-leg-4-6: 96, 108, 102. I-leg-2 ventrally with one heavy, feathered seta and one slender, feathered seta. Lengths of IV-leg-4-6: 259, 168, 132.

Male: unknown.

ETYMOLOGY. — Named for its occurrence on New Caledonia.

REMARKS. — The discovery of a new Javathyas species on New Caledonia is remarkable, as the two other known species occur both in the Oriental region, i.e. Java and India (Viets 1935a; Cook 1967). The new species differs in a quadratic anteromedial dorsal plate, while both other species have a (slightly) elongated plate. Moreover, the two central dorsal medial plates are elongated in the new species, while they are more circular in the two other species. The two known species have a median eye on the anteromedial plate, but this is not visible in the new species, perhaps a result of being fixed in ethanol.

Family OXIDAE Viets

**Genus FRONTIPODA** Koenike, 1891

Frontipoda Koenike, 1891: 19.

**Frontipoda (Frontipoda) mouensis** n. sp.

Figs 5-8


DIAGNOSIS. — Idiosoma slender, about two times as long as high, complete medial suture line present, PIV stocky.
FIGS 1-8. 1, *Javathyas neocaledonicus* n. sp., holotype female, dorsal view, scale bar = 200 µm. 2, *Javathyas neocaledonicus* n. sp., holotype female, ventral view, scale bar = 200 µm. 3, *Javathyas neocaledonicus* n. sp., holotype female, i-leg-1-6, scale bar = 50 µm. 4, *Javathyas neocaledonicus* n. sp., holotype female, palp, scale bar = 50 µm. 5, *Frontipoda mouensis* n. sp., holotype male, dorsal view, scale bar = 50 µm. 6, *Frontipoda mouensis* n. sp., holotype male, ventral view, scale bar = 50 µm. 7, *Frontipoda mouensis* n. sp., holotype male, lateral view, scale bar = 50 µm. 8, *Frontipoda mouensis* n. sp., holotype male, palp, scale bar = 50 µm.
DESCRIPTION. — Male: integument finely striated, idiosoma 551 long, 234 wide and 259 high, laterally compressed. Coxal field expanded, occupying most of idiosoma. Dorsal furrow wide, with elongated median sclerites, which become shorter posteriorly. Coxal field with four pairs of glandularia, including coxoglandularia 1. First coxal plates with two stout, curved setae; in ventral view these setae appear flattened. Tips of coxal plates with a reticulate pattern. A distinct median suture line present. Genital field 106 long, with three pairs of acetabula. Excretory pore terminal. Lengths of PI-PV: 19, 22, 22, 32, 12; PI dorsally with one relatively stout setae, PII dorsally with one stout and one thin seta, PIII dorsally with four long, thin setae, PIV anterodorsally with one long, thin seta. Lengths of I-leg-4-6: 40, 46, 42. Lengths of IV-leg-4-6: 52, 68, 64; terminal seta of IV-leg-6 98 long. Fifth segment of legs II-IV with 4-5 swimming setae.

Female: unknown.

ETYMOLOGY. — Named after Mont Mou, the mountains where the type locality is situated.

REMARKS. — A very Oxus-like Frontipoda species, with idiosoma height not much larger than its width. The new species is very similar to the Australian Oxus troma Cook, 1986 also a slender species with a wide dorsal furrow with median sclerites. However, the Australian species lacks a ventral median suture line, and has only three pairs of glandularia incorporated in the coxal field. All known New Caledonian Frontipoda species except F. purpurea n. sp. (see below) lack a median suture line.

**Frontipoda (Frontipoda) neocaledonica** Smit, 2002


REMARKS. — Reported previously from two localities in New Caledonia.

**Frontipoda purpurea** n. sp.


DIAGNOSIS. — Idiosoma about 1.5 times as long as high, partial median suture line present, PIV slender.

DESCRIPTION. — Male: idiosoma 737 long, 292 wide and 502 high. Idiosoma purple, laterally compressed. Coxal field expanded, occupying most of idiosoma. Dorsal furrow wide, with two elongated median sclerites, the anterior sclerite longer than the posterior sclerite. Coxal field with five pairs of glandularia, including coxoglandularia 1. First coxal plates with two stout setae, one slightly curved, the other longer, more strongly curved and with small pectinations. A distinct incomplete median suture line present. Genital field 112 long, with three pairs of acetabula. Excretory pore unsclerotized, close to genital field and located between associated glandularia. Lengths of PI-PV: 28, 28, 30, 50, 16. PI dorsally with one stout seta, PII dorsally with two stout setae, PIII dorsally with one stout and two thin setae, PIV anterodorsally with one long, thin seta and more posteriorly two short, thin setae. Lengths of I-leg-4-6: 63, 84, 76. Lengths of IV-leg-4-6: 72, 88, 82. Terminal seta of IV-leg-6 134 long. Legs II-IV with numerous long swimming setae, arranged in a comb-like structure. Claws of legs I-III with clawlet and without claw blade.

Female: unknown.
FIGS 9-17. 9, *Frontipoda purpurea* n. sp., holotype male, dorsal view, scale bar = 50 µm. 10, *Frontipoda purpurea* n. sp., holotype male, ventral view, scale bar = 50 µm. 11, *Frontipoda purpurea* n. sp., holotype male, lateral view, scale bar = 50 µm. 12, *Frontipoda purpurea* n. sp., holotype male, palp, scale bar = 50 µm. 13, *Frontipoda purpurea* n. sp., holotype male, i-leg-4-6, scale bar = 50 µm. 14, *Aspidiobates brevipes* n. sp., holotype female, dorsal view, scale bar = 50 µm. 15, *Aspidiobates brevipes* n. sp., holotype female, ventral view, scale bar = 50 µm. 16, *Aspidiobates brevipes* n. sp., holotype female, palp, scale bar = 50 µm. 17, *Aspidiobates brevipes* n. sp., holotype female, IV-leg-4-6, scale bar = 50 µm.
REMARKS. — This is the second New Caledonian *Frontipoda* species with a ventral median suture line.

**Genus *OXUS*** Kramer, 1877

*Oxus* Kramer, 1877: 239.

**Oxus ingens** Smit, 2002


REMARKS. — Thus far, the male was unknown and is described here for the first time. It is very similar to the female, and differs only in several measurements.

**Oxus orientalis** Walter, 1915


REMARKS. — From New Caledonia this species has been reported previously from two localities. *Oxus orientalis* has also been found in Australia.

Family *HYGROBATIDAE* Koch

**Genus *ASPIDIOBATES*** Lundblad, 1941

*Aspidiobates* Lundblad, 1941: 115.

REMARKS. — From New Caledonia 13 species of the genus *Aspidiobates* are known (K. O. Viets 1969; Smit 2002). The genus has undergone a remarkable radiation. In this paper a further six new species are described, bringing the total to 19. The genus *Aspidiobates* occurs in Australia (eight species), New Zealand, South America (each with one species), Vanuatu (two species), while Goldschmidt (2006) reported it from Costa Rica.

A number of species are very common in streams (e.g., *A. violaceus* K. O. Viets, *A. lundbladi* K. O. Viets, *A. starmuehlneri* K. O. Viets), and therefore records of these species will not be given in this paper. Smit (2002) pointed out the characteristics of the New Caledonian members of this genus. During this study it was noted that young specimens have a complete dorsal shield, while in more chitinized specimens the dorsum has the characteristic large dorsal plate with a number of smaller posterior plates.
**Aspidiobates brevipes** n. sp.
Figs 14-17


DIAGNOSIS. — Leg segments stocky, PII with a triangular ventral extension.


Male: unknown.

ETYMOLOGY. — Named for its short legs.

REMARKS. — The very stocky leg segments and the stocky palp with the pointed triangular extension of PII are characteristic for the new species. Moreover, the very convex idiosoma is also remarkable.

**Aspidiobates convexus** n. sp.
Figs 18-20

*Aspidiobates neocaledonicus* Smit, 2002: 181. (part., female)

TYPE MATERIAL. — Holotype male, small forest stream near l’Auberge, Mt. Koghi, New Caledonia, 16 November 2005, leg. H. Smit (MNHN). Paratypes: male, same data as holotype (ZMAN); 1 female, small limnocrene along main road, Parc prov. Rivière Bleue, 22°05.961'S, 166°40.773'E, 13 November 2005, leg. H. Smit (ZMAN); 1 female, unnamed creek, Monts Néngoné at crossing with road to Port Boisé, 22°17.097'S, 166°53.538'E, alt. 224 m, leg. H. Smit (MNHN).

DIAGNOSIS. — Posteriorly to fourth coxal plates two pairs of glandularia, idiosoma strongly convex, female with large gonopore.

DESCRIPTION. — Male: idiosoma ventrally 421 (373) long and 373 (300) wide, dorsally 413 (348) long. Idiosoma strongly convex. Ventral and dorsal shields present. Dorsum anteriorly with one large plate, 405 long, and posteriorly with two elongate, smaller plates. Anterior coxal plates slightly extending beyond anterior idiosoma margin. Suture lines of coxal plates incomplete. Glandularia of fourth coxal plates located in the middle. Posteriorly of fourth coxal plates two pairs of glandularia. In the paratype male the two glandularia are lying more distant, while the lateral pair are closer to the fourth coxal plates. Gonopore 62 long, slender. Genital field with three pairs of acetabula. Lengths of PI-PV: 20, 54, 40, 69, 30. Palp without ventral extension of PII of setal tubercles of PIV. Lengths of I-leg-4-6: 64, 72, 54. Lengths of IV-leg-4-6: 82, 98, 84. II-leg-5, III-leg-5 and IV-leg-5 with two swimming setae.
Female: described by Smit (2002) as the female of *A. neocaledonicus* Smit. Some additional measurements and characters: idiosoma ventrally 397-409 long and 344-365 wide, dorsally 381-373 long. Posteriorly of fourth coxal plates two pairs of glandularia, medial pair closer to fourth coxal plates, but in the female from Col d’Amieu the lateral pair is slightly closer to the fourth coxal plates. Swimming setae as in male.

**ETYMOLOGY.** — Named for the convex shape of the idiosoma.

**REMARKS.** — The female described by me (Smit 2002) as *A. neocaledonicus* cannot be assigned to that species, see under the latter. There is some variation in the configuration of the two pairs of glandularia, both in distance to each other as to which pair is closest to the fourth coxal plates. However, they are similar in all other characters, and therefore all are assigned to the new species.

The only other convex species of New Caledonia with two pairs of glandularia posteriorly of the fourth coxal plates is *A. brevipes* n. sp. However, this species has a triangular extension of PII and stocky leg segments. *Aspidiobates imamurai* is slightly convex and has also two pairs of glandularia posteriorly of the fourth coxal plates, but the gonopore of the female is much smaller, the suture lines of the first and second coxal plates are nearly complete and the posterior plates of the dorsum are much broader.

**FIGS 18-23.** *Aspidiobates convexus* n. sp. 18, holotype male, dorsal view, scale bar = 50 µm. 19, *Aspidiobates convexus* n. sp., holotype male, ventral view, scale bar = 50 µm. 20, *Aspidiobates convexus* n. sp., holotype male, palp, scale bar = 50 µm. 21, *Aspidiobates denticulatus* n. sp., holotype male, ventral view, scale bar = 50 µm. 22, *Aspidiobates denticulatus* n. sp., holotype male, palp, scale bar = 50 µm. 23, *Aspidiobates denticulatus* n. sp., holotype male, capitulum, scale bar = 50 µm.
Aspidiobates denticulatus n. sp.
Figs 21-23


DIAGNOSIS. — PIII with a short ventral extension, covered with small denticles, PII with a long, slightly bowed ventral extension.


Female: unknown.

ETYMOLOGY. — Named after the small denticles of PIII.

REMARKS. — The holotype male is not completely developed, the dorsal shield still consists of one soft plate. However, it is the palp which shows the differentiating characters. Only one other Aspidiobates species has a PIII with a ventral extension, i.e. A. parvulus K. O. Viets. However, this species has a triangular extension of both PII and PIII, and the ventral setae of PIV are located far anteriorly and close to each other.

Aspidiobates imamurai K. O. Viets, 1969


REMARKS. — A rare species, thus far only known from one male and one female from Rivière Hienghène (K. O. Viets 1969). The newly recorded specimens differ in the two glandularia posteriorly of the fourth coxal plates. These are located much closer to each other than in the female illustrated by Viets (1969). However, in all other aspects they are similar. The male described by Viets (1969) has only one pair of glandularia posteriorly to the fourth coxal plates. Therefore, it is in my opinion somewhat doubtful that male and female belong to the same species. More material is needed to solve this question, especially for the male.

Aspidiobates longisetus n. sp.
Figs 24-28


Aspidiobates longisetus n. sp.
Figs 24-28

ETYMOLOGY. — Named for the long setae on the dorsum.

DIAGNOSIS. — Glandularia of large dorsal plate accompanied by very long, stout setae; PII stocky.

DESCRIPTION. — Female: idiosoma dorsally 737 long and 567 wide. Dorsal and ventral shields present. Dorsum with one large plate and posteriorly two smaller ones, but these smaller plates (still ?) incomplete. Glandularia of large dorsal plate accompanied by very long (up to 178), stout setae. Gnathosoma without a rostrum. Coxal plates in three groups. Genital field with three pairs of acetabula, the central acetabulum the largest. Gonopore 130 long. Lengths of PI-PV: 26, 111, 70, 105, 36. PII stocky, PIV with a hyaline membrane along ventral margin. Lengths of I-leg-4-6: 109, 104, 70. Lengths of IV-leg-4-6: 196, 198, 141; IV-leg-5 with two rudimentary swimming setae.

Male: unknown.

REMARKS. — The unusual long setae on the large dorsal plate are not found in other large (> 700 µm) members of the genus.

Aspidiobates minutus Smit, 2002
Figs 29-34


MATERIAL EXAMINED. — Holotype male, small tributary of first forest stream north of Tao Falls ( Mt. Panié), New Caledonia, 30 September 2000, leg. H. Smit (MNHN).


DIAGNOSIS. — Coxal plates with longitudinal ridges, cheliceral claw slender, posterior to fourth coxal plates two pairs of glandularia, the medial pair closest to fourth coxal plates.

FIGS 24-34. 24, Aspidiobates longisetus n. sp., holotype female, dorsal view, scale bar = 200 µm. 25, Aspidiobates longisetus n. sp., holotype female, ventral view, scale bar = 200 µm. 26, Aspidiobates longisetus n. sp., holotype female, genital field, scale bar = 50 µm. 27, Aspidiobates longisetus n. sp., holotype female, palp, scale bar = 50 µm. 28, Aspidiobates longisetus n. sp., holotype female, palp, scale bar = 50 µm. 29, Aspidiobates minutus Smit, male, dorsal view, scale bar = 50 µm. 30, Aspidiobates minutus Smit, male, ventral view, scale bar = 50 µm. 31, Aspidiobates minutus Smit, female, dorsal view, scale bar = 50 µm. 32, Aspidiobates minutus Smit, female, ventral view, scale bar = 50 µm. 33, Aspidiobates minutus Smit, female, palp + capitulum, scale bar = 50 µm. 34, Aspidiobates minutus Smit, female, IV-leg-4-6, scale bar = 50 µm.

REMARKS. — The longitudinal ridges were not observed by me when describing this species. However, they are present in the holotype male. The holotype male is smaller than the specimens of this study, 300 long ventrally and 208 wide, 275 long dorsally. Moreover, I overlooked one of the two glandularia between the coxal plates and the genital field. Therefore a redescription is given for the male, while the female is described here for the first time.

**Aspidiobates neocaledonicus** Smit, 2002  
Figs 35-37


DESCRIPTION. — Female: idiosoma ventrally 348 long and 293 wide, dorsally 372 long. Dorsal and ventral shields present. Dorsum with one large anterior plate and four smaller posterior plates. Setae associated with glandularia of large dorsal plate long. First coxal plates not extending beyond anterior idiosoma margin. Suture lines of first and second coxal plates fused medially, other suture lines incomplete. Fourth coxal plate with one large glandularium, posterior of these large glandularia a pair of glandularia. Area between the latter and genital field without glandularia. Chelicera (including claw) 96 long, cheliceral claw 34 long. Gonopore 34 long. Genital field with three pairs of acetabula. Lengths of PI-PV: 18, 40, 32, 56, 20; palp as in male. Lengths of I-leg-4-6: 40, 46, 42. Lengths of IV-leg-4-6: 66, 64, 50. IV-leg-5 with a rudimentary swimming seta.

REMARKS. — With more material available, it is clear that the female described by me (Smit 2002) does not belong to *A. neocaledonicus*. It has two pairs of glandularia posterior to the fourth coxal plates, while in the male there is only one pair. Moreover, the suture lines of the first and second coxal plates are not fused medially. This female is therefore described here as a new species, see under *A. convexus* n. sp.

**Aspidiobates rarus** Smit, 2002  
Figs 38-39


DESCRIPTION. — Male: idiosoma dorsally 456 long and 300 wide, ventrally 498 long. Dorsum with one large plate and posteriorly two smaller plates, these indistinct and partially covered by the large plate. Smaller plates 90 long and 40 wide, large plate 429 long and 275 wide. Coxal plates of the illustrated specimen indistinct (but distinct in other specimens), first coxal plates fused, coxal plates 1-3 pointed posteriorly, posterior margin of fourth coxal plates with relatively long apodemes. Glandularia of fourth coxal plates shifted onto anterior margin of third coxal plates. Genital field with three pairs of acetabula, gonopore 46 long. Lengths of PI-PV: 16, 55, 48, 63, 22; palp as in female. Lengths of I-leg-4-6: 80, 78, 60; I-leg-5 distally with a bowed seta. Lengths of IV-leg-4-6: 120, 118, 82.

REMARKS. — The male is described here for the first time. Like the female it is easily identified by its rectangular shape, while the small posterior dorsal plates are partially covered by the large plate. When describing the species it was known from the holotype female only, and therefore considered rare (hence the name). This study shows that the species is much more common, although it always occurs in low numbers.

Aspidiobates simplipalpis n. sp.
Figs 40-42


DIAGNOSIS. — Palp simple, without extension of PII or setal tubercle of PIV.


Male: unknown.

ETYMOLOGY. — Named for its simple palp, without extension of PII or setal tubercle of PIV.
REMARKS. – This species lacks an extension of PII, which is only found in *A. spatiosus*, *A. longisetus* n. sp. and some of the smaller (less than 500 µm) species. *Aspidiobates spatiosus* is much larger and has much larger acetabula, while *A. longisetus* n. sp. has a stockier PIV and only one pair of posterior dorsal plates. The doubling of the smaller posterior plates is also found in other species, e.g., *A. neocaledonicus*. Very likely, specimens with the normal number of posterior plates (in this case two pairs) will also be found.

Aspidiobates suturalis Smit, 2002


REMARKS. — Previously, only known from two localities (Smit 2002). One of the females from the Rivière Ouaneoué measures 664 in length and 454 in width, and is much larger than the paratype females, which are 518-539 long and 356-365 wide.

Aspidiobates villosus n. sp.

Figs 43-50


DIAGNOSIS. — Idiosoma covered with small spines, dorsum of female with one large plate and five smaller platelets.


Female: idiosoma ventrally 875 (848-1021) long and 624 (567-682) wide, dorsally 786 (672-761) long. Ventral and dorsal shields present. Idiosoma covered by small spines, which appear triangular in dorsal view. Dorsum with one large, anterior plate and five smaller platelets. Large anterior plate with two pairs of glandularia and a pair of postocularia, two lateral pairs each with one pair of glandularia; central platelet rounded, without glandularia. Praeocularia...
on large tubercles. First coxal plates extending beyond anterior body margin. Coxal plates laterally with a wing-like extension. Suture line of all coxal plates indistinct, posterior suture line of fourth coxal plates oblique. Glandularia of ventral shield on large tubercles. Genital field with four pairs of acetabula; gonopore 150 long. Gnathosoma with a long rostrum, 356 long; chelicere 324 long, cheliceral claw strongly bowed. Lengths of PI-PV: 30, 140, 116, 104, 28. PII ventrally with a long, bowed extension. PIV ventrally with a large setal tubercle. Lengths of I-leg-4-6: 154, 130, 97; I-leg-5 with rudimentary swimming setae. Lengths of IV-leg-4-6: 203, 200, 120. All leg segments with numerous curved, short setae, those of the ventral margin pectinate.

ETYMOLOGY. — Named for the small spines on the idiosoma.

FIGS 43-50. 43, Aspidiobates villosus n. sp., holotype female, ventral view, scale bar = 200 µm. 44, Aspidiobates villosus n. sp., holotype female, dorsal view, scale bar = 200 µm. 45, Aspidiobates villosus n. sp., holotype female, genital field, scale bar = 50 µm. 46, Aspidiobates villosus n. sp., holotype female, palp + capitulum, scale bar = 50 µm. 47, Aspidiobates villosus n. sp., holotype female, palp, scale bar = 50 µm. 48, Aspidiobates villosus n. sp., holotype female, capitulum, ventral view, scale bar = 50 µm. 49, Aspidiobates villosus n. sp., paratype male, dorsal view, scale bar = 200 µm. 50, Aspidiobates villosus n. sp., paratype male, ventral view, scale bar = 200 µm.
REMARKS. — The only known *Aspidiobates* species with one large dorsal plate and five dorsal platelets in the female are the Australian *A. geometricus* Cook and the Chilean *A. harveyi* Cook. Both species lack the integument spines, have three pairs of acetabula and lack a ventral extension of PII.

KEY TO THE NEW CALEDONIAN *ASPIDIOBATES* SPECIES

1. Dorsal idiosoma length 500 µm or smaller
   - Dorsal idiosoma length more than 500 µm ................................................................. 2
2. PII with a ventral extension ......................................................................................... 11
   - PII without ventral extension .................................................................................... 3
3. PII and PIII with a triangular ventral extension ....................................................... *A. parvulus* K. O. Viets
   - PII with a small rounded extension covered with denticles, PII with a large somewhat bowed extension ................................................................. *A. denticulatus* n. sp.
4. PII with a ventral extension ....................................................................................... 5
   - PII without a ventral extension ................................................................................ 6
5. Suture lines of first and second coxal plates complete, ending in a long medial suture line; leg segments not stocky ................................................................. *A. suturalis* Smit
   - Suture lines of first and second coxal plates incomplete, leg segments stocky .......... *A. brevipes* n. sp.
6. Between fourth coxal plates and genital field one pair of glandularia ......................... 7
   - Between fourth coxal plates and genital field two pairs of glandularia ....................... 9
7. Posterior idiosoma tapering .......................................................................................... 9
   - Posterior idiosoma not tapering .............................................................................. 8
8. Posterior smaller plates of dorsum partially covered by large dorsal plate ............... *A. rarus* Smit
   - Posterior smaller plates of dorsum not partially covered by large dorsal plate ........
9. Fourth coxal plates with longitudinal ridges ............................................................. 10
   - Longitudinal ridges absent ...................................................................................... 10
10. Idiosoma strongly convex, female with large gonopore ........................................ *A. convexus* n. sp.
   - Idiosoma only slightly convex, gonopore small ...................................................... female *A. imamurai* K. O. Viets
11. Idiosoma covered with many large spines, female with six dorsal plates .......... *A. villosus* n. sp.
   - Idiosoma covered with many large spines, female with five dorsal plates ............ 12
12. PII without ventral extension and PIV without setal tubercles ................................ 13
   - PII with ventral extension or PIV with setal tubercles ........................................ 14
13. Acetabula very large (> 70 µm in diameter), suture lines of third and fourth coxal plates complete, glandularia between fourth coxal plates close to genital field .................... *A. spatiosus* K. O. Viets
   - Acetabula small (< 30 µm in diameter), suture lines of third and fourth coxal plates incomplete, glandularia between fourth coxal plates close to fourth coxal plates ........... *A. simplipalpis* n. sp.
14. PII without ventral extension .................................................................................. 15
   - PII with ventral extension ..................................................................................... 17
15. Glandularia of fourth coxal plates shifted to anterior margin of third coxal plates, posterior plates of dorsum partially covered by large anterior plate ............................................ *A. rarus* Smit
   - Glandularia of fourth coxal plates near anterior margin of fourth coxal plates, posterior plates of dorsum not partially covered by large anterior plate ........................................ 16
16. Palp stocky, PIV without setal tubercles, setae associated with glandularia of large dorsal plate long. ........................................................................................................ *A. longisetus* n. sp.
- Palp more slender, PIV with setal tubercles, setae associated with glandularia of large dorsal plate short ................................................................. A. violaceus K. O. Viets
17. PIV with setal tubercles ........................................................................................................... A. serratus K. O. Viets
- PIV without setal tubercles ....................................................................................................... 18
18. Acetabula very large, largest diameter > 60 µm ................................................................. A. caeruleus K. O. Viets
- Acetabula small, largest diameter < 60 µm ............................................................................... 19
19. Rostrum short, cheliceral claw slightly curved ................................................................. A. lundbladi K. O. Viets
- Rostrum long, cheliceral claw strongly curved ........................................................................ 20
20. Ventral margin of PIV with one very long seta, extension of ventral margin of PII of male broad ...... ................................................................................................................................. A. starmuehlneri K. O. Viets
- Ventral margin of PIV with only short setae, extension of ventral margin of PII of male slender .......... ................................................................................................................................. A. motasi K. O. Viets

**Genus ASPIDIOBATOPSIS** Smit, 2002

*Aspidiobatopsis* Smit, 2002: 186.

**Aspidiobatopsis rubra** Smit, 2002


REMARKS. – Previously known from one male and one female only.

**Genus GONDWANABATES** Imamura, 1984

*Gondwanabates* Imamura, 1984: 64.

So far only known from Australia, where nine species have been described (Cook 1986; Harvey 1998). The new species described below necessitates an expansion of the diagnosis of the genus: Posterior margin of fourth coxal plates sloping or directed perpendicularly to lateral idiosoma margin; glandularia of fourth coxal plates located near suture line of third and fourth coxal plates or shifted anteriorly beyond suture line of second and third coxal plates; ventral margin of PII with or without papillae; I-leg-5 with or without distal heavy seta.

**Gondwanabates neocaledonicus** n. sp.

Figs 51-54


DIAGNOSIS. – Glandularia of fourth coxal plates shifted anteriorly beyond suture line of second and third coxal plates; ventral margin of PII without papillae, ventral margin of PIV with two setal tubercles.

ETYMOLOGY. — Named after the island of New Caledonia.

REMARKS. — The new species differs in a number of characters from Australian members of the genus: the posterior margin of the fourth coxal plates is directed perpendicularly to the lateral idiosoma margin (sloping in Australian species), the glandularia of the fourth coxal plates are shifted anteriorly (only slightly shifted in some Australian species), the ventral margin of PII is without papillae and I-leg-5 lacks a distal heavy seta.

**Genus CALEDONIABATES** Smit, 2002


* Caledoniabates inflatipalpis Smit, 2002


REMARKS. — One female from Rivière Tamoa is 705 long ventrally, 591 long dorsally and 506 wide, thus being much larger than the females known previously.

* Caledoniabates purpureus Smit, 2002

FIGS 51-59. 51, Gondwanabates neocaledonicus n. sp., holotype female, dorsal view, scale bar = 50 µm. 52, Gondwanabates neocaledonicus n. sp., holotype female, ventral view, scale bar = 50 µm. 53, Gondwanabates neocaledonicus n. sp., holotype female, palp, scale bar = 50 µm. 54, Gondwanabates neocaledonicus n. sp., holotype female, I-leg-4-6, scale bar = 50 µm. 55, Caledoniabates asper, holotype male, dorsal view, scale bar = 50 µm. 56, Caledoniabates asper, holotype male, ventral view, scale bar = 50 µm. 57, Caledoniabates asper, holotype male, palp, scale bar = 50 µm. 58, Cookaturus triacetabulatus Smit, female, dorsal view, scale bar = 50 µm. 59, Cookaturus triacetabulatus Smit, female, ventral view, scale bar = 50 µm.
**Caledoniabates asper** n. sp.

Figs 55-57


**DIAGNOSIS.** — Idiosoma papillate, especially at posterior idiosoma margin; dorsal margin of PII and PIII undulating.

**DESCRIPTION.** — Male: idiosoma ventrally 486 long and 348 wide, dorsally 389 long. Idiosoma colour lilac. Dorsal and ventral shields present. Dorsum anteriorly with one large plate, 308 long and 292 wide, and two smaller posterior plates, 144 long and 70 wide. Large anterior plate with three pairs of glandularia and a pair of postocularia, posterior plates with one pair of glandularia. Ventral shield posteriorly with two pairs of large tubercles. First coxal plates extending well beyond anterior idiosoma margin. Capitulum fused with venter. First and second coxal plates fused to form a large U-shape. Gonopore 70 long. Genital field with three pairs of acetabula. Lengths of PI-PV: 23, 62, 51, 78, 50. PII and PIII with a large ventral extension, segments with a reticulated pattern, dorsal margin of these segments undulating. PIV ventrally with setal tubercles, setae longer than segment (but broken in illustrated palp). Lengths of I-leg-4-6: 78, 79, 70. Lengths of IV-leg-4-6: 96, 96, 79. Legs without swimming setae.

Female: unknown.

**ETYMOLOGY.** — Named for the rough surface of the integument.

**REMARKS.** — This is the third species of the endemic genus *Caledoniabates*. It is easily separated from the two known species by its papillate idiosoma and the undulating dorsal margin of PII and PIII.

Family ATURIDAE Thor

Subfamily AXONOPSINAE Viets

**Genus** *Cookaturus* Smit, 2002


**Cookaturus triacetabulatus** Smit, 2002

Figs 58-59


**DESCRIPTION.** — Female: idiosoma 373 (381-413) long and 316 (312-340) wide. Dorsum with one large plate, 343 long and 259 wide, with three pairs of glandularia and a pair of postocularia. Dorsal furrow with four pairs of glandularia.
Capitulum with a long anchoral process, not fused with first coxal plates. Suture lines of coxal plates incomplete. A well developed ridge present anteriorly of fourth legs sockets. Glandularia of fourth coxal plates located near medial end of suture lines of third and fourth coxal plates. Genital field with four pairs of acetabula; anterior margin fused with ventral shield. Lengths of PI-PV: 21, 44, 28, 52, 28; PIV with an anteromedial seta, palp as in male. Lengths of I-leg-4-6: 52, 62, 54. Lengths of IV-leg-4-6: 54, 58, 68. II-leg-5, III-leg-5 and IV-leg-5 with two swimming setae, I-leg-5 with a rudimentary swimming seta.

REMARKS. — The female has not been described before. The female is similar to C. disparilis, and differs in the number of glandularia of the dorsal plate: three pairs in triacetabulus and four pairs in disparilis. Like C. disparilis, the male and female of C. triacetabulatus have different number of acetabula: three pairs in the male and four pair in the female.

Family UNIONICOLIDAE Oudemans

**Genus NEUMANIA** Lebert, 1879

*Neumania* Lebert, 1879: 357.

*Neumania nodosa* (Daday, 1898)

*Atax nodosus* Dayad, 1898: 97.

*Neumania neo-caledonica* Walter, 1915: 111.


REMARKS. — A widespread species, known from Australia, New Guinea and Asia. It has been reported previously from two other locations in New Caledonia.

**Genus RECIFELLA** Viets, 1935


*Recifella (Eorecifella) neocaledonica* Smit, 2002

*Recifella (Eorecifella) neocaledonica* Smit, 2002: 197.


**Recifella (Eorecifella) stygophila** n. sp.

Figs 60-64

TYPE MATERIAL. — Holotype male, Kuenthio Rivière, hyporheic, 21°44.627’S, 166°05.530’E, 15 November 2005, leg. H. Smit (MNHN). Paratype female, same data as holotype (MNHN).
DIAGNOSIS. — Dorsal shield with three pairs of glandularia.


FIGS 60-66. 60, Recifella stygophila n. sp., holotype male, dorsal shield, scale bar = 50 µm. 61, Recifella stygophila n. sp., holotype male, ventral view, scale bar = 50 µm. 62, Recifella stygophila n. sp., holotype male, palp, scale bar = 50 µm. 63, Recifella stygophila n. sp., holotype male, IV-leg-4-6, scale bar = 50 µm. 64, Recifella stygophila n. sp., paratype female, ventral view, scale bar = 50 µm. 65, Koenikea solitarius Smit, male, dorsal shield, scale bar = 200 µm. 66, Koenikea solitarius Smit, male, ventral view, scale bar = 50 µm.
modified, IV-leg-5 straight, with two ventral setae with enlarged pectinations anteriorly and two posterior setae without pectinations. IV-leg-6 ventrally with two pectinated setae. IV-leg-5 with two short swimming setae. Excretory pore located well anterior to posterior idiosoma margin.


REMARKS. — Only one other species of the subgenus Eorecifella is known from New Caledonia, i.e. R. neocaledonica. The new species differs in the number of glandularia of the dorsal plate (three in the new species, four in R. neocaledonica), the location of the setal tubercle of PIV (distally in the new species, well before distal end in R. neocaledonica) and the number of setae on IV-leg-5 (five in R. neocaledonica, four in the new species). This is the second Recifella species from hyporheic waters, the first one is known from Australia (Smit 2007).

**Genus KOENIKEA** Wolcott, 1900

Koenikea Wolcott, 1900: 189.

*Koenikea (Notomideopsis) rotunda* Smit, 2002

Koenikea (Notomideopsis) rotunda Smit, 2002: 201.

MATERIAL EXAMINED. — 1 male, unnamed creek near Refuge de la Rivière Blanche, Parc Provincial Rivière Bleue, 22°10.096'S, 166°39.948'E, alt. 171 m, 13 November 2005, leg. H. Smit; 5 males, 2 females, 1 nymph, Rivière Bleue, at Pont Germain, Parc Provincial Rivière Bleue, 22°06.029'S, 166°42.284'E, alt 172 m, 13 November 2005.

REMARKS. — Thus far only known from the Parc Provincial Rivière Bleue in the southern part of New Caledonia.

*Koenikea (Notomideopsis) solitaria* Smit, 2002

Figs 65-66


DESCRIPTION. — Male: idiosoma 559 (526-660) long and 478 (456-535) wide, purple. Dorsal and ventral shields present. Dorsal shield complete, 518 (494-609) long and 429 (415-502) wide. Dorsal shield with six pairs of glandularia, none of which are on tubercles. First coxal plates extending slightly beyond anterior idiosoma
margin. Tips of first coxal plates rounded. Apodemes of anterior coxal plates extending to posterior margin of third coxal plates. Suture lines of second and third coxal plates incomplete. Medial margin of third coxal plates larger than medial margin of fourth coxal plates. Coxoglandularia 2 located near posterior margin of fourth coxal plates. Gonopore 54 long. Genital field with 12-13 pairs of acetabula, but not all of these can be seen in ventral view. Excretory pore terminal. Lengths of PI-PV: 20, 76, 42, 80, 38; palp as in female. Lengths of I-leg-4-6: 152, 142, 166; first leg with long grooved setae. Lengths of IV-leg-4-6: 154, 170, 174. IV-leg-6 ventrally with five setae, IV-leg-5 ventrally with eight setae, the most anterior seta pectinate. III-leg-4, III-leg-5 and IV-leg-5 with three swimming setae, IV-leg-4 with five swimming setae, IV-leg-3 and III-leg-3 with one swimming seta, the latter short.

Female: idiosoma 608-672 long and 536-591 wide. Dorsal shield 575-607 long and 491-526 wide.

REMARKS. — Thus far only the holotype female was known. The male is described here for the first time, while some additional measurements are given for the female.

Family NUDOMIDEOPSIDAE I. M. Smith

Genus NUDOMIDEOPSIS Szalay, 1945

Nudomideopsis Szalay, 1945: 49.

Nudomideopsis (Allomideopsis) maryae n. sp.

Figs 67-71

TYPE MATERIAL. — Holotype male, Creek Pandanus, 21°01.422'S, 164°46.626'E, 20 November 1999, New Caledonia, leg. N. Mary (MNHN).

DIAGNOSIS. — Acetabula of male very slender.


Female: unknown.

ETYMOLOGY. — Named after Nathalie Mary, who collected the material.

REMARKS. — Smith (1990) erected Allomideopsis as a new subgenus of Nudomideopsis. Differences as compared with Nudomideopsis s. str. were a more elongated dorsal shield (more than 1.3 times as long as wide), posterior edges of fourth coxal shield obliterated and PIV stocky and slightly expanded ventrally. Females with acetabula on the ventral shield flanking the gonopore. The male described here fits in Allomideopsis, with a dorsal shield 1.38 times as long as wide, the absence of a posterior margin of the fourth coxal plates and a stocky PIV. Only the ventral margin of PIV
is not expanded, and therefore a small emendation of the diagnosis of the subgenus is given here: PIV slightly or not expanded ventrally.

Within the Australasian region, members of the Nudomideopsidae have been found only in New Zealand. Cook (1983, 1992) reported four species of *Nudomideopsis* (s. str.) and one species of *Paramideopsis* I. M. Smith.
Family ARRENURIDAE Thor

Genus ARRENURUS Dugès, 1834

**Arrenurus (Megaluracarus) dahli** Piersig, 1898


REMARKS. — Chitinized patches of the gonopore are either present or absent. Already Piersig (1903) mentioned that these chitinized patches were often indistinct. A female reported previously by me from New Caledonia (as *Arrenurus* sp., Smit 2002) also belongs to this species. It has been collected in the same area, but the idiosoma colour is orange, while all specimens reported in this study are greenish. *Arrenurus dahli* is known from the Bismarck Archipelago, Indonesia (Aru Islands, Buru) and New Caledonia.

**Arrenurus (Micruracarus) expansipalpis** (Smit, 2002) n. comb.

Figs 72-74

*Wuria expansipalpis* Smit, 2002: 204.


Female: already described by Smit (2002). Only some measurements will be given. Idiosoma 575-502 long and 482-527 wide. Antagonistic bristle present, apparently lost in the holotype female.

REMARKS. — Now that the male is known, it is clear that this species cannot be assigned to the genus *Wuria*, but that is has to be assigned to *Arrenurus*. Gerecke (2004) already pointed out the resemblance with *Arrenurus*. The small petiole in combination with a dorsal concavity of the male idiosoma are characters of the subgenus *Micruracarus*.

ACKNOWLEDGMENTS

I am indebted to Nathalie Mary for providing water mites, to Clémentine Flourh (Nouméa) for her assistance during my stay on New Caledonia, to Truus van der Pal for assisting me during the field work and to Mark Judson (MNHN) for the loan of the holotype of *Aspidiobates minutus*. Johannes Postma (Ann Arbor) reviewed the English.
REFERENCES


