

A faunistic account of aquatic Coleoptera from the Samoan Archipelago (Pacific Ocean)

(Coleoptera: Gyrinidae, Dytiscidae, Noteridae, Hydrophilidae excl. Sphaeridiinae)

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Abstract

A faunistic overview of some families of aquatic beetles from the Samoan Archipelago (Gyrinidae, Dytiscidae, Noteridae, Hydrophilidae excl. Sphaeridiinae) is provided, based on a literature survey and on recent field work (2001–2018), as well as on material of the Bernice P. Bishop Museum (Honolulu, Hawaii, USA), collected in the 1950s and 1960s.

Doubtful records based on historical specimens are discussed. The occurrence of 16 species of water beetles (Gyrinidae: 1, Dytiscidae: 8, Noteridae: 2, Hydrophilidae excl. Sphaeridiinae: 5) in the Samoan Archipelago is here confirmed, but one fourth of these species (25%) could not or just tentatively be identified, because of insufficient sampling, lack of modern taxonomic revisions, and/or lack of molecular data.

The family Gyrinidae (*Dineutus australis* (FABRICIUS, 1775)) as well as the following taxa are recorded from the Samoan Archipelago for the first time: *Hydrovatus fasciatus* SHARP, 1882, *Laccophilus semingeri* FAUVEL, 1883 (Dytiscidae), *Neohydrocoptus subfasciatus* (SHARP, 1882) (Noteridae), *Crephelochares* KUWERT, 1890, and *Enochrus* ? *nigropiceus* (MOTSCHULSKY, 1861) (Hydrophilidae).

Copelatus marginatus SHARP, 1882, *Cybister tripunctatus temnenkii* AUBÉ, 1838, *Hydaticus consanguineus* AUBÉ, 1838, *Limbodessus curvuplicatus* (ZIMMERMANN, 1927), *Rhantus hiebei* BALKE, 1993 (Dytiscidae), *Notomicrus* cf. *tenellus* CLARK, 1863 (Noteridae), *Enochrus esuriens* (WALKER, 1858) and *Helochares simulator* KNISCH, 1922 (Hydrophilidae), which were already known from the Independent State of Samoa, are here recorded from American Samoa for the first time.

Habitus photographs of 12 species are provided, as well as habitat photographs and habitat data as far as they were available.

Key words: Coleoptera, water beetles, Gyrinidae, Dytiscidae, Noteridae, Hydrophilidae, Samoa, American Samoa, Pacific Ocean, Oceania, faunistics, distribution, ecology, first records.

Introduction

The Samoan Archipelago is located in the South Pacific Ocean at approximately 13–15 degrees south and 169–173 degrees east. It is politically divided between the western islands, which make up the Independent State of Samoa, and the easternmost islands, which comprise American Samoa, which also includes two remote atolls: Swains Island, ca. 350 km to the north, and Rose Atoll, ca. 150 km to the east.

The total land area is approximately 3,100 km². Over 90 % of this land area consists of the three largest islands: Savai'i and Upolu (Independent State of Samoa) and Tutuila (American Samoa). The highest elevation is 1,860 m a.s.l. on Savai'i. The mostly volcanic islands range in age from the westernmost Savai'i Island, formed ca. five million years ago, and the easternmost island Ta'u, formed only about 100,000 years ago (NUNN 1998, KOPPERS et al. 2008).

The climate is warm and humid year-round, and the terrestrial flora ranges from undisturbed upland rainforests and coastal littoral vegetation to managed farms and gardens (WHISTLER

2002). Freshwater habitats include marshes, swamps, intermittent and permanent small streams and small lakes as well as temporary ground pools (BUXTON 1935).

Distances to other archipelagos are quite long: about 650 km to Wallis and Futuna, about 950 km to Tonga, 1,100 km to Fiji, 2,200 to Vanuatu and 2,600 km to New Caledonia.

A notable collection of beetles from Samoa was assembled by the German zoologist Karl Friederichs (1878–1969), who was employed in Samoa as a plant pathologist from 1912 till 1913. Accounts on the water beetles, which were collected by him mainly around Apia (Upolu Island, Samoa), were published by FRIEDERICHS (1922) and KNISCH (1922). They recorded three species of Dytiscidae (*Copelatus marginatus* SHARP, 1882, “*Rhantus pulverosus* Steph. var. ?” [= *Rhantus hiekei* BALKE, 1993], and *Hydaticus consanguineus* AUBÉ, 1838), all identified by A. Zimmermann, as well as two hydrophilids, *Enochrus (Lumetus) esuriens* (WALKER, 1858) [incorrectly spelled as “*escuriens*”] and “*Enochrus (Lumetus)* nov. spec.”, identified by A. Knisch.

In 1924 and 1925 P.A. Buxton and G.H.E. Hopkins worked for the London School of Tropical Medicine in Apia (Upolu Island, Samoa). In their spare time they collected insects, mainly in the area of Apia but also on Savai'i, Tutuila and some small islands. In the publications based on these collections also material of the Bernice P. Bishop Museum, Honolulu (Hawaii, USA) and of some other collectors are included (see BUXTON 1935: 35). Based on this material, ZIMMERMANN (1927) recorded three additional species of Dytiscidae and one Noteridae from Samoa, while ORCHYMONT (1927) published records of three aquatic Hydrophilidae. Later on, the aquatic Coleoptera of Oceania were summarized by BALFOUR-BROWNE (1945) who listed seven species of Dytiscidae, one Noteridae and four aquatic Hydrophilidae. Finally, BALKE (1993) described *Rhantus hiekei* (Dytiscidae), which had previously been recorded from Samoa as “*Rhantus pulverosus* Steph. var. ?” (FRIEDERICHS 1922).

Unfortunately, the true identity of some of the taxa that were previously recorded from the Samoan Archipelago is still not entirely clear, especially in the hydrophilid genus *Enochrus* THOMSON, 1859. Comprehensive taxonomic revisions and the inclusion of molecular data as well as additional sampling will be necessary to improve our knowledge of the water beetle fauna of the Samoan Archipelago. The results of the present paper are to be regarded as a first step to achieve this goal. These results are based mainly on a thorough literature survey, on recent field work (M. Balke, M.A. Schmaedick & G. Wewalka, 2017), as well as on material of the Bernice P. Bishop Museum (Honolulu, Hawaii, USA), and additional material of the American Samoa Community College (Malaeimi, American Samoa).

Material and methods

Gyrinidae and Dytiscidae have been determined by M. Balke and G. Wewalka, Noteridae by M. Toledo, and Hydrophilidae by A. Komarek.

Although there are a few species of the hydrophilid subfamily Sphaeridiinae recorded from the Samoan Archipelago (see BALFOUR-BROWNE 1945), they are not included in our faunistic account, because many sphaeridiines are regarded as terrestrial; no specimens were collected by M. Balke, M.A. Schmaedick and G. Wewalka during their survey in 2017. The Hydraenidae collected during the 2017 survey shall be published in a forthcoming paper.

Historical specimens deposited in the ZSM (coll. Zimmerman) and labelled “Samoa” (printed on blue cardboard, without further details), were probably collected by Karl Friederichs in 1912–1913. If so, they are most likely from Apia (Upolu Island, Samoa) (see FRIEDERICHS 1922: 148).

In the systematic account below, the names of doubtfully recorded species, which are based solely on historical specimens, are placed between square brackets.

Abbreviations:

ASCC	American Samoa Community College, Malaeimi, American Samoa
BMNH	Natural History Museum, London, UK
BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, USA
CGW	coll. Günther Wewalka, Vienna, Austria
DEI	Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany
NMW	Naturhistorisches Museum Wien, Vienna, Austria
ZSM	Zoologische Staatssammlung München, Germany

Gyrinidae

Dineutus (Cyclous) australis (FABRICIUS, 1775)

Dineutus (Cyclous) australis: BALFOUR-BROWNE 1945: 115 (Oceania).

*Dineutus (Ciclou*s [sic!]) *australis*: MAZZOLDI 2010: 35 (New Caledonia).

TYPE LOCALITY: Australia (“Nova Hollandia”, further details unknown).

SAMOAN MATERIAL EXAMINED:

SAMOA: Savai'i Isl.: 4 exs.: ca. 3 km S Fagamalo, -13.47113° -172.39721°, ca. 100 m a.s.l., muddy creek in meadow, 17.VIII.2017, leg. G. Wewalka (CGW).

IDENTIFICATION: Habitus as in MAZZOLDI (2010: figs. 1a–b, 10).

HABITAT: Specimens have been found in a slowly flowing creek; additional specimens were observed by G. Wewalka & M. Balke in various small streams in the same area on Savai'i Isl.

DISTRIBUTION: Southeastern China, Oriental and Australian/Oceanian regions (including New Caledonia, Vanuatu, Fiji), Samoa (Savai'i Isl.) (Fig. 15). First record of the family for the Samoan Archipelago.

Dytiscidae

Copelatus marginatus SHARP, 1882

Copelatus marginatus: FRIEDERICH 1922: 148 (Samoa); ZIMMERMANN 1927: 17 (Samoa); BALFOUR-BROWNE 1945: 113 (Oceania); KAMI & MILLER 1998: 16 (Samoa checklist); WEWALKA et al. 2010: 50 (New Caledonia, taxonomy); NILSSON & HÁJEK 2023: 59 (world catalogue); WEWALKA et al. 2023: 259 (New Caledonia).

TYPE LOCALITY: Australia (Queensland).

SAMOAN MATERIAL EXAMINED:

AMERICAN SAMOA: Tutuila Isl.: 4 exs.: Taputimu Farm, 3.VIII.1964, N.R. Spencer (BPBM, ZSM); 1 ex.: Taputimu, 5.IX.1964, leg. N.R. Spencer (BPBM); 1 ex.: Tāfuna, 5.VIII.1964, leg. N.R. Spencer (BPBM).

SAMOA: Upolu Isl.: 2 exs.: “Samoa” (ZSM); 1 ex.: Apia, II.1955, leg. N.L.H. Krauss (BPBM).

IDENTIFICATION: Habitus and aedeagus as in WEWALKA et al. (2010: figs. 37a–c, 83a).

HABITAT: Detailed information on the exact habitats of the Samoan locations are unknown. In New Caledonia, this species occurs in stagnant water bodies and temporary water courses (WEWALKA et al. 2010, WEWALKA et al. 2023).

DISTRIBUTION: Australia, New Guinea, New Caledonia, Fiji, Tonga, Samoa (Upolu Isl.), American Samoa (first record) (Tutuila Isl.) (Fig. 13). Remarkably, this species has not been collected in the Samoan Archipelago since 1964.

***Cybister tripunctatus temnenkii* AUBÉ, 1838**

Cybister tripunctatus OLIVIER, 1795: ZIMMERMANN 1927: 19 (Samoa); KAMI & MILLER 1998: 17 (partim) (Samoa checklist).

Cybister tripunctatus hamatus MONTROUZIER, 1857: BALFOUR-BROWNE 1945: 115, 122 (Oceania, Samoa).

Cybister tripunctatus temnenkii: HENDRICH et al. 2010: 183 (New Caledonia); NILSSON & HÁJEK 2023: 81 (world catalogue); WEWALKA et al. 2023: 278 (New Caledonia).

TYPE LOCALITY: Indonesia ("Java (etc.)").

SAMOAN MATERIAL EXAMINED:

AMERICAN SAMOA: Tutuila Isl.: 1 ex.: Tula, -14.25035° -170.56832°, swampy pond in village, 3 m a.s.l., 10.VIII.2017, leg. M. Balke (ZSM); 1 ex.: Malaeloa, at light, 3.III.2004, leg. K. Marcos (ASCC); 1 ex.: Malaeloa, 21.IX.2004, marsh, leg. M. Schmaedick (ASCC); Aunu'u Isl.: 1 ex. (larva): Faimulivai Marsh (crater marsh), -14.28291° -170.55156°, 2 m a.s.l., 10.VIII.2017, leg. M. Balke (ZSM).

SAMOA: Upolu Isl.: 5 exs. (larvae): Lake Lanoto'o, -13.91041° -171.82576°, 770 m a.s.l., 5./21.VIII.2017, leg. M. Balke (ZSM); Savai'i Isl.: 2 exs.: S Safotu, -13.47113° -172.39721°, muddy creek in meadow, 100 m a.s.l., 17.VIII.2017, leg. G. Wewalka (CGW).

IDENTIFICATION: Habitus as in HENDRICH et al. (2010: fig. 17).

HABITAT: Samoan specimens were collected in a lake (Fig. 19), a small swampy pond (Fig. 20), crater marshes (Fig. 21), and in a slowly running part of a muddy creek, with dense aquatic vegetation and grasses at the margin, and at light. In other countries, this species occurs in a variety of larger stagnant water bodies, and it was also collected in shallow, slowly flowing low-land streams.

DISTRIBUTION: This subspecies is widely distributed throughout the Australian/Oceanian Region: Australia, New Guinea, New Caledonia, Fiji, Tonga, Samoa (Savai'i Isl., Upolu Isl.), American Samoa (first record) (Aunu'u Isl., Tutuila Isl.) (Fig. 13).

***Hydaticus consanguineus* AUBÉ, 1838**

Hydaticus consanguineus: FRIEDERICHs 1922: 148 (Samoa); ZIMMERMANN 1927: 19 (Samoa); BALFOUR-BROWNE 1945: 114 (Oceania); WEWALKA 1979: 133 (taxonomic revision); KAMI & MILLER 1998: 17 (Samoa checklist); HENDRICH et al. 2010: 185 (New Caledonia); NILSSON & HÁJEK 2023: 95 (world catalogue); WEWALKA 2023: 25 (taxonomic revision); WEWALKA et al. 2023: 280 (New Caledonia).

TYPE LOCALITY: Australia ("Nouvelle-Hollande", without further details).

SAMOAN MATERIAL EXAMINED:

AMERICAN SAMOA: Tutuila Isl.: 26 exs.: Tula, swampy pond in village, -14.25035° -170.56832°, 3 m a.s.l., 10.VIII.2017, leg. G. Wewalka & M. Balke (CGW, ZSM); 1 ♂, 1 ♀: Tula, marsh, 10.VIII.2017, leg. M. Meredith (ASCC); 2 ♀ ♀: Vailoa, marsh, 20.III.2018, leg. M.A. Schmaedick (ASCC); 1 ♂: Malaeimi, pond, 13.V.2004, leg. N. Gurr (ASCC); Aunu'u Isl.: 1 ex.: Faimulivai Marsh (crater marsh), -14.28291° -170.55156°, 2 m a.s.l., 10.VIII.2017, leg. M. Balke (ZSM); Ofu Isl.: 1 ♀: Vaoto Marsh, 19.X.2017, leg. M.A. Schmaedick (ASCC).

SAMOA: 1 ex.: "Samoa" (printed on blue cardboard); this might be a specimen from Friederichs, if so, it is most likely from Upolu: Apia (ZSM); Upolu Isl.: 2 exs. Malololelei, 9.VI.1924, leg. P.A. Buxton & G.H. Hopkins (ZSM); 2 exs.: Papasea Road., near Apia, ca. 30 m a.s.l., 4.VIII.2017, -13.85315° -171.78173°, leg. M. Balke (ZSM); Savai'i Isl.: 1 ex.: Savai'i (ZSM); 12 exs.: NW Pu'apu'a, -13.55271° -172.23807°, puddle on gravel with grass mats, ca. 10 m a.s.l., 17.VIII.2017, leg. G. Wewalka (CGW).

IDENTIFICATION: Habitus as in HENDRICH et al. (2010: fig. 14).

HABITAT: Specimens have been collected in a swampy pond (Fig. 20), a crater marsh (Fig. 21), and a puddle on gravel with grass mats.

DISTRIBUTION: Australia, Solomon Islands, New Caledonia, Vanuatu, Kermadec Islands, Fiji, Tonga, Samoa (Savai'i Isl., Upolu Isl.), American Samoa (first record) (Aunu'u Isl., Ofu Isl., Tutuila Isl.) (Fig. 13).

[*Hydaticus rhantaticoides* RÉGIMBART, 1892]

Hydaticus rhantaticoides: BALFOUR-BROWNE 1945: 114, 121 (Oceania, Samoa); WEWALKA 2015: 24 (taxonomic revision); NILSSON & HÁJEK 2023: 99 (world catalogue).

TYPE LOCALITY: Papua New Guinea.

SAMOAN MATERIAL EXAMINED:

SAMOA: 1 ♂, 2 ♀ ♀: “Samoa” (DEI, ZSM). The labels of these specimens (printed on blue cardboard, without further details) are similar to those of other dytiscids, which were collected in Samoa by K. Friederichs and identified by A. Zimmermann. However, this species was not mentioned in FRIEDERICHS (1922) or in ZIMMERMANN (1927); see also BALFOUR-BROWNE (1945: 121).

IDENTIFICATION: Habitus of a specimen labelled “Samoa”: Fig. 1.

DISTRIBUTION: New Guinea, Australia, Bismarck Archipelago, Solomon Islands, ? Samoa (unconfirmed record) (Fig. 13).

No other specimens of *Hydaticus rhantaticoides* are known from Samoa, or from anywhere east of the Solomon Islands. The locality information “Samoa” could be wrong, or the specimens are based on a temporary introduction, or the species is very rare or extinct in Samoa. In any case, the occurrence of *H. rhantaticoides* in Samoa needs confirmation.

***Hydrovatus fasciatus* SHARP, 1882**

Hydrovatus fasciatus: BISTRÖM 1997: 339 (taxonomic revision); HENDRICH et al. 2010: 180 (New Caledonia); NILSSON & HÁJEK 2023: 178 (world catalogue); WEWALKA et al. 2023: 286 (New Caledonia).

TYPE LOCALITY: Australia (Queensland).

SAMOAN MATERIAL EXAMINED:

AMERICAN SAMOA: Tutuila Isl.: 11 exs.: Tula, -14.25035° -170.56832°, swampy pond in village, 3 m a.s.l., 10.VIII.2017, leg. G. Wewalka & M. Balke (CGW, ZSM); Aunu'u Isl.: 2 exs.: taro plantation in wetland behind Aunu'u Village, -14.28415° -170.55747°, 4 m a.s.l., 10.VIII.2017, leg. G. Wewalka (CGW); 3 exs.: Faimulivai Marsh (crater marsh), -14.28291° -170.55156°, 2 m a.s.l., 10.VIII.2017, leg. M. Balke (ZSM); Ofu Isl.: 1 ex.: Vaoto Marsh, 19.X.2017, leg. M.A. Schmaedick (ASCC).

SAMOA: Upolu Isl.: 197 exs.: Lake Lanoto'o, -13.91041° -171.82576°, 770 m a.s.l., 5./21.VIII.2017, leg. G. Wewalka & M. Balke (CGW, ZSM); 6 exs.: Le Mafa Pass Road, near Sopo'aga Waterfall, 31.VII.2017, ca. 100 m a.s.l., leg. G. Wewalka (CGW).

IDENTIFICATION: Habitus as in HENDRICH et al. (2010: fig. 9).

HABITAT: Specimens were collected in a lake (Fig. 19), a swampy pond (Fig. 20), a crater marsh (Fig. 21), a taro plantation (Fig. 22), and a slowly running part of a small creek.

DISTRIBUTION: Philippines, Indonesia, Australia, New Caledonia, Fiji, Samoa (Upolu Isl.), American Samoa (Aunu'u Isl., Ofu Isl., Tutuila Isl.) (Fig. 14). First record for the Samoan Archipelago.

***Laccophilus seminiger* FAUVEL, 1883**

Laccophilus seminiger: BRANCUCCI 1983: 371 (taxonomy); HENDRICH et al. 2010: 174 (New Caledonia); NILSSON & HÁJEK 2023: 233 (world catalogue); WEWALKA et al. 2023: 312 (New Caledonia).

TYPE LOCALITY: New Caledonia.

SAMOAN MATERIAL EXAMINED:

AMERICAN SAMOA: Aunu'u Isl.: 17 exs.: Faimulivai Marsh (crater marsh), -14.28291° -170.55156°, 2 m a.s.l., 10.VIII.2017, leg. M. Balke (CGW, ZSM).

IDENTIFICATION: Habitus as in Fig. 2. In specimens from American Samoa, the head is predominantly yellowish-brown as in specimens from New Caledonia, but they differ in the reduced yellowish markings on the pronotum and in the slenderer habitus. However, molecular data (M. Balke, unpublished) suggest that specimens from New Guinea, Australia, New Caledonia (type locality), and Samoa are obviously conspecific.

HABITAT: Specimens were collected from the reed belt of a crater marsh (Fig. 21), where the water was deep, clear and cool.

DISTRIBUTION: New Guinea, Australia, Solomon Islands: Guadalcanal, Florida Isl.; Mariana Archipelago; New Caledonia, Wallis & Futuna (WEWALKA et al. 2023: 312), American Samoa (Aunu'u Isl.) (Fig. 14). First record for the Samoan Archipelago.

Limbodessus curviplicatus (ZIMMERMANN, 1927)

Bidessus curviplicatus ZIMMERMANN 1927: 16 (original description, Samoa); BALFOUR-BROWNE 1945: 112 (Oceania); KAMI & MILLER 1998: 16 (Samoa checklist).

Limbodessus curviplicatus: BALKE & RIBERA 2004: 117 (taxonomy); BALKE et al. 2017: 148 (taxonomy); NILSSON & HÁJEK 2023: 120 (world catalogue).

TYPE LOCALITY: Samoa (Upolu Island, Mulifanua).

TYPE MATERIAL (ZIMMERMANN 1927): Holotype ♂ (BMNH) and one paratype ♂ (ZSM) from Samoa (Upolu Isl.).

ADDITIONAL MATERIAL EXAMINED:

AMERICAN SAMOA: Tutuila Isl.: 1 ex.: Tāfūna, 13.X.1964, leg. Spencer (BPBM); Aunu'u Isl.: 4 exs.: Faimulivai Marsh (crater marsh), -14.28291° -170.55156°, 2 m a.s.l., 10.VIII.2017, leg. M. Balke (ZSM); 1 ex.: small pool of water, ca. 30 cm deep, at the side of an infrequently used dirt road in a secondary forest, 3.II.2013, leg. M.A. Schmaedick (ASCC).

SAMOA: Upolu Isl.: 10 exs.: Lake Lanoto'o, -13.91041° -171.8257°, 770 m a.s.l., 5./21.VIII.2017, leg. M. Balke (ZSM); 4 exs.: Malua ("Tufulele"), EFKS Fine Art Museum, -13.79972° -171.90424°, 8 m a.s.l., 22.VIII.2017, wetland, leg. G. Wewalka & M. Balke (CGW, ZSM); Savai'i Isl.: 23 exs.: NW Pu'apu'a, -13.55271° -172.23807°, puddle on gravel with grass mats, ca. 10 m a.s.l., 17.VIII.2017, leg. G. Wewalka (CGW).

IDENTIFICATION: Habitus as in Fig. 3.

HABITAT: In American Samoa, specimens were collected from a grassy wetland near the coast (Fig. 18), from a lake (Fig. 19), and the reed belt of a crater marsh (Fig. 21), where the water was deep, clear and cool. Specimens were also collected in a puddle on gravel with grass mats.

DISTRIBUTION: Fiji, Samoa (Savai'i Isl., Upolu Isl.), American Samoa (first record) (Aunu'u Isl., Tutuila Isl.) (Fig. 14).

Rhantus hiekei BALKE, 1993

Rantus [sic!] *annectens* SHARP, 1882: BALFOUR-BROWNE 1945: 113 (partim) (Oceania, Samoa).

Rhantus pulverosus var. ? : FRIEDERICH 1922: 148 (Samoa).

Rhantus pulverosus: ZIMMERMANN 1927: 18 (partim) (Samoa); KAMI & MILLER 1998: 17 (partim) (Samoa checklist).

Rhantus hiekei BALKE 1993: 58 (Samoa, original description); BALKE 2001: 275 (checklist); BALKE et al. 2007: 200 (checklist); NILSSON & HÁJEK 2023: 44 (world catalogue).

Rhantus annectens: KAMI & MILLER 1998: 17 (partim) (Samoa checklist).

TYPE LOCALITY: Samoa (Upolu Island).

TYPE MATERIAL (BALKE 1993): Holotype ♂ (BMNH) and three paratypes (BMNH: 2 ♀ ♀, ZSM: 1 ♂); the latter obviously refers to the specimen listed by FRIEDERICH (1922: 148) under the name "*Rhantus pulverosus* var. ?" and was probably collected on Upolu Island.

The paratype from the Bismarck Archipelago (New Britain), deposited in the DEI probably belongs to a different (? undescribed) species.

ADDITIONAL MATERIAL EXAMINED:

AMERICAN SAMOA: Tutuila Isl.: 1 ex.: Taputimu Farm, 29.X.1963, leg. N.R. Spencer (BPBM); 2 exs.: Taputimu, 5.VII.1964, leg. N.R. Spencer (BPBM); 10 exs.: Fagatogo, 3.XII.1963, leg. N.R. Spencer (BPBM, ZSM); 11 exs.: behind American Samoa Community College, -14.31984° -170.74293°, creek in disturbed forest, 60–90 m a.s.l., 7.VIII.2017, leg. G. Wewalka & M. Balke (CGW, ZSM); 4 exs.: N Mesepa, -14.31104° -170.74863°, creek in disturbed forest, 260 m a.s.l., 8.VIII.2017, leg. G. Wewalka & M. Balke (CGW, ZSM); 1 ♂, 1 ♀: Malaeimi, pool of intermittent stream, 21.IX.2004, leg. M.A. Schmaedick (ASCC); 1 ♀: Malaeimi, Malaise trap in mixed fruit tree plantation, 22.–29.IX.2001, leg. M.A. Schmaedick (ASCC); 1 ♂: Leone, -14.32597° -170.78308°, multifunnel trap at edge of rainforest, 31.V.–6.VI.2017, leg. M.A. Schmaedick (ASCC); Aunu'u Isl.: 1 ♂: puddle on dirt road, 1.III.2006, leg. N. Gurr (ASCC).

SAMOA: Upolu Isl.: 16 exs.: Cross Island Road near pass, -13.93091° -171.77948°, water holes near creek, ca. 700 m a.s.l., 31.VII./2.VIII.2017, leg. G. Wewalka & M. Balke (CGW, ZSM); 7 exs.: Cross Island Road, -13.95654° -171.77660°, intermittent stream, water holes on volcanic rock, 510 m a.s.l., 4.VIII.2017, leg. G. Wewalka & M. Balke (ZSM); 2 exs.: Lake Lanoto'o, -13.91041° -171.82576°, 770 m a.s.l., 5./21.VIII.2017, leg. G. Wewalka & M. Balke (CGW, ZSM); 5 exs. (4 adults, 1 larva): Malololelei, -13.89199° -171.79759°, 520 m a.s.l., 7.VIII.2017, leg. M. Balke (ZSM); 4 exs.: Malololelei, -13.88227° -171.79330°, puddle in forest, 260 m a.s.l., 12.VIII.2017, leg. M. Balke (ZSM); 5 exs.: road near Lupe Sina Treeresort, -13.96219° -171.76786°, creek, 500 m a.s.l., 13.VIII.2017, leg. M. Balke (ZSM).

IDENTIFICATION: Habitus as in Fig. 4.

HABITAT: Specimens were collected in a lake (Fig. 19), in stream pools and rock holes in streams as well as puddles in intermittent streams, and were also observed in ditches on and along hiking trails.

DISTRIBUTION: Very probably endemic to the Samoan Archipelago. Samoa (Upolu Isl.), American Samoa (first record) (Aunu'u Isl., Tutuila Isl.) (Fig. 15).

Rhantus liopteroides ZIMMERMANN, 1927

Rhantus liopteroides ZIMMERMANN 1927: 17 (Samoa, original description); BALFOUR-BROWNE 1945: 113 (Oceania); BALKE 1993: 55 (redescription); KAMI & MILLER 1998: 17 (Samoa checklist); BALKE 2001: 275 (checklist); BALKE et al. 2007: 200 (checklist); NILSSON & HÁJEK 2023: 44 (world catalogue).

TYPE LOCALITY: Samoa (Upolu Island, Malololelei, ca. 7 km south of Apia).

TYPE MATERIAL (BALKE 1993): Holotype ♂ (BMNH) and three paratypes (BMNH: 1 ♂, ZSM: 2 ♂♂) from the type locality.

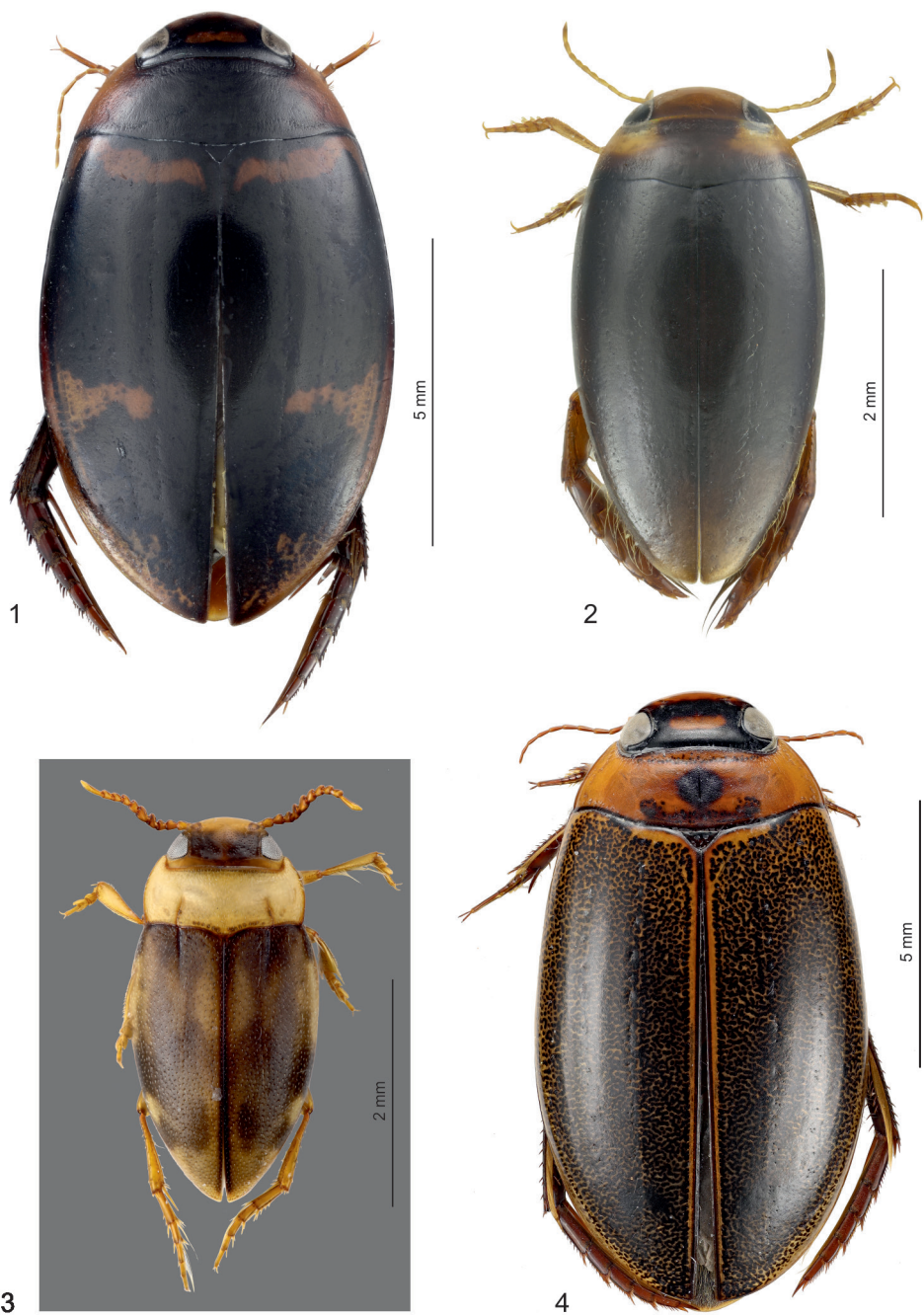
IDENTIFICATION: Habitus as in Fig. 5.

COMMENTS: This species has not been collected since May 1924. The four type specimens (leg. P.A. Buxton & G.H.E. Hopkins) are the only specimens known so far. The authors of the present article failed to find additional specimens, despite investigating various aquatic habitats near Malololelei.

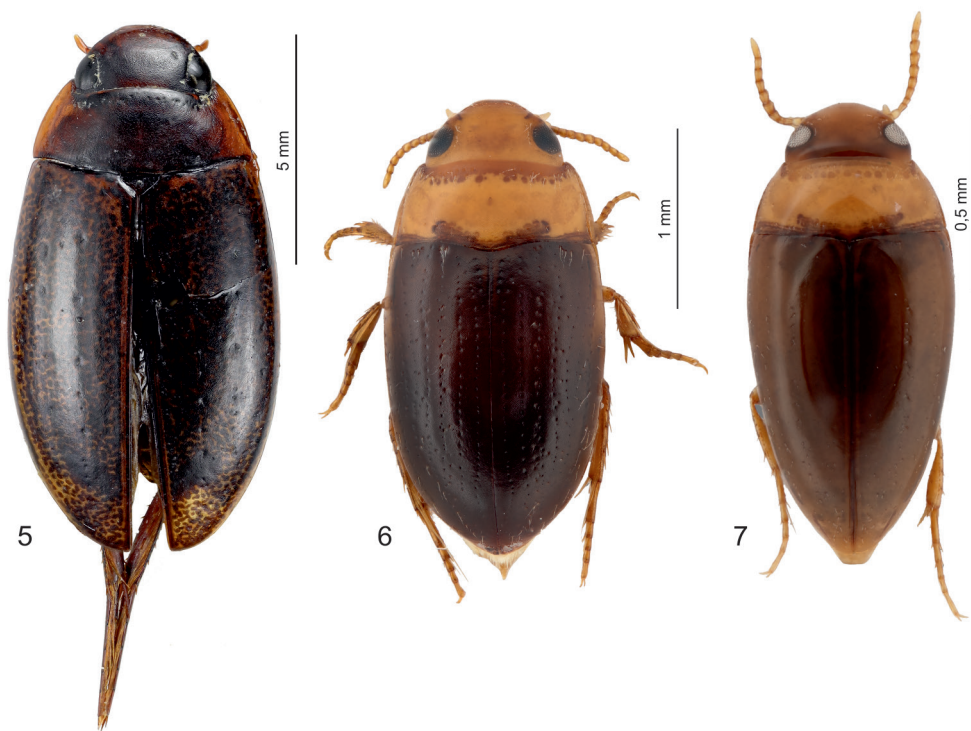
According to the type labels, this species was collected at “2000 feet” (ca. 600 m), but it is not clear, whether these data refer to the actual collecting site, or whether they refer to the settlement of Malololelei. In the early 20th century, naturalists usually did not provide very accurate locality data on the labels of their specimens. P.A. Buxton & G.H.E. Hopkins had obviously used Malololelei (where they spent several months) as a base for their excursions in this area of Upolu. Therefore, it is well possible that the type material was found on one of the remote mountains in the surroundings of Malololelei.

HABITAT: Habitat data are not available.

DISTRIBUTION: Endemic to Samoa (Upolu Isl.) (Fig. 14).



Figs. 1–4: Habitus of 1) *Hydaticus rhanaticoides* (“Samoa”), 2) *Laccophilus seminiger* (American Samoa, Aunu‘u Isl.), 3) *Limbodessus curvuplicatus* (Samoa, Upolu Isl.), 4) *Rhantus hieki* (Samoa, Upolu Isl.).



Figs. 5–7: Habitus of 5) *Rhantus liopteroides* (Samoa, Upolu Island, paratype), 6) *Neohydrocoptus subfasciatus* (Samoa, Upolu Isl.), 7) *Notomicrus* cf. *tenellus* (Samoa, Upolu Isl.).

Noteridae

Neohydrocoptus subfasciatus (SHARP, 1882)

Neohydrocoptus subfasciatus subfasciatus: TOLEDO 2010: 209 (taxonomy, New Caledonia); NILSSON 2011: 7 (world catalogue); WEWALKA et al. 2023: 313 (New Caledonia).

TYPE LOCALITY: Australia (Queensland).

SAMOAN MATERIAL EXAMINED:

AMERICAN SAMOA: Tutuila Isl.: 1 ex.: Tula, -14.25035° -170.56832°, swampy pond in village, 3 m a.s.l., 10.VIII.2017, leg. G. Wewalka (CGW); Aunu'u Isl.: 1 ex.: Faimulivai Marsh (crater marsh), -14.28291° -170.55156°, 2 m a.s.l., 10.VIII.2017, leg. M. Balke (ZSM).

SAMOA: Upolu Isl.: 8 exs.: Lake Lanoto'o, -13.91041° -171.82576°, 770 m a.s.l., 5./21.VIII.2017, leg. M. Balke (ZSM).

IDENTIFICATION: Habitus as in Fig. 6.

HABITAT: This species was collected in stagnant water (swampy village pond, crater marsh, lake) (Fig. 19–21).

DISTRIBUTION: Sulawesi, Australia, New Caledonia, Samoa (Upolu Isl.), American Samoa (Aunu'u Isl., Tutuila Isl.) (Fig. 15). First record for the Samoan Archipelago.

The subspecies *H. subfasciatus major* TOLEDO, 2010 has been described from New Guinea (see TOLEDO 2010: 208).

***Notomicrus cf. tenellus* CLARK, 1863**

Notomicrus tenellus: ZIMMERMANN 1927: 16 (Samoa); BALFOUR-BROWNE 1945: 112 (Oceania); KAMI & MILLER 1998: 17 (Samoa checklist); NILSSON 2011: 43 (world catalogue).

Notomicrus tenellus species complex: TOLEDO 2010: 199 (taxonomy, New Caledonia).

SAMOAN MATERIAL EXAMINED:

AMERICAN SAMOA: Ofu Isl.: 1 ex.: Vaoto Marsh, 19.X.2017, leg. M.A. Schmaedick (ASCC).

SAMOA: Upolu Isl.: 1 ex.: Mulifanua, 4.X.1925 (ZSM); 8 exs.: margins of Lake Lanoto'o, -13.91041°-171.82576°, 770 m a.s.l., 5./21.VIII.2017, leg. M. Balke (ZSM); 17 exs.: Malua ("Tufulele"), EFKS Fine Art Museum, -13.79972° -171.90424°, 8 m a.s.l., 22.VIII.2017, wetland, leg. G. Wewalka & M. Balke (CGW, ZSM).

IDENTIFICATION: Habitus as in Fig. 7.

COMMENTS: This species is most likely different from the "true" *N. tenellus* (described from Java, recorded from Malaysia, Singapore, Philippines, Indonesia, Australia, Papua New Guinea, Solomon Islands) based on morphology (TOLEDO 2010) and genetic data (M. Balke, unpublished), but this requires further investigation.

HABITAT: Shallow stagnant water bodies (Figs. 18–19).

DISTRIBUTION: Samoa (Upolu Isl.), American Samoa (first record) (Ofu Isl.) (Fig. 15). Very probably endemic to the Samoan Archipelago.

Hydrophilidae

The Hydrophilidae of the Pacific Region are still in need of a thorough taxonomic revision, which should preferably include molecular data.

Five aquatic species of Hydrophilidae have been collected by M. Balke, M.A. Schmaedick & G. Wewalka in the Samoan Arcipelago in August 2017. However, two of these species, *Crephelochares* sp. and *Enochrus* ? *nigropiceus* (MOTSCHULSKY, 1861), are represented by females only, impeding their unambiguous identification. Only three species of Hydrophilidae could be identified with certainty (using the keys of SHORT 2010): *Enochrus esuriens*, *E. maculiceps* (MACLEAY, 1871) (= *E. bryani* ORCHYMONT, 1927, originally described from Samoa), and *Helochares* (s.str.) *simulator* KNISCH, 1922.

In the past, two additional nominal taxa of *Enochrus* have been recorded from Samoa: *E. natalensis* (GEMMINGER & HAROLD, 1868), and *E. ? tritus* (BROUN, 1880) – for literature details, see below. These records are based on historical specimens, collected in Samoa about 100 years ago. Although a taxonomic revision of *Enochrus* is still unavailable, it seems that these two species have to be deleted from the list of the hydrophilids of the Samoan Archipelago.

In any case, it will be necessary to examine all these historical specimens in order to find out their true identities. This task is, however, beyond the scope of the present study, because it would require a comprehensive taxonomic revision of the Pacific hydrophilids, based on morphological and molecular data.

***Crephelochares* sp.**

Crephelochares KUWERT, 1890 was re-established as a valid genus by GIRÓN & SHORT (2021). It is confined to the Old World, while its sister genus, *Chasmogenus* SHARP, 1882, occurs exclusively in Central and South America. SHORT (2010) published a review of the species of *Crephelochares* (under the name *Chasmogenus*) of the Southwest Pacific islands.

SAMOA MATERIAL EXAMINED:

SAMOA: Upolu Isl.: 2 ♀ ♀: Lake Lanoto'o, -13.91041° -171.82576°, 770 m a.s.l., 5./21.VIII.2017, leg. M. Balke (ZSM).

IDENTIFICATION: Habitus as in Fig. 8.

Three species of *Crephelochares* are so far known from the Southwest Pacific islands (east of the Solomon Islands and north of New Zealand): *C. balkei* (SHORT, 2010) (Fiji Islands), *C. nitescens* (FAUVEL, 1883) (Australia, Papua New Guinea, Solomon Islands, New Caledonia, Fiji Islands), and *C. punctulatus* (SHORT, 2010) (Fiji Islands).

According to the key to the species of the Southwest Pacific islands (SHORT 2010), the two females from Samoa are close to *C. balkei* and the widespread *C. nitescens*, especially on account of the ground punctation and the excision of the anterior margin of the clypeus (see SHORT 2010). However, the specimens from Samoa are considerably larger (body length: 5.0 mm) than the two other species, which are 3.0–4.0 mm long. The systematic punctures of the pronotum and the elytra are large and well impressed.

Very probably, the two specimens represent an undescribed species, but they cannot be described as long as no males are available.

HABITAT: The specimens were collected at a lake margin, at higher elevation (Fig. 19).

DISTRIBUTION: Samoa (Upolu Isl.) (Fig. 16). The genus *Crephelochares* is here recorded from the Samoan Archipelago for the first time.

Enochrus (Methydrus) esuriens (WALKER, 1858)

Enochrus (Lumetus) esuriens [sic!]: KNISCH 1922: 151 (Samoa: "Apia").

Enochrus (Lumetus) esuriens: BALFOUR-BROWNE 1945: 111, 129–130 ("Samoa").

Enochrus (Methydrus) esuriens: WATTS 1998: 147 (taxonomic revision); HANSEN 1999: 181 (world catalogue, "Samoa"); SHORT 2010: 305 (New Caledonia).

TYPE LOCALITY: Sri Lanka.

SAMOA MATERIAL EXAMINED:

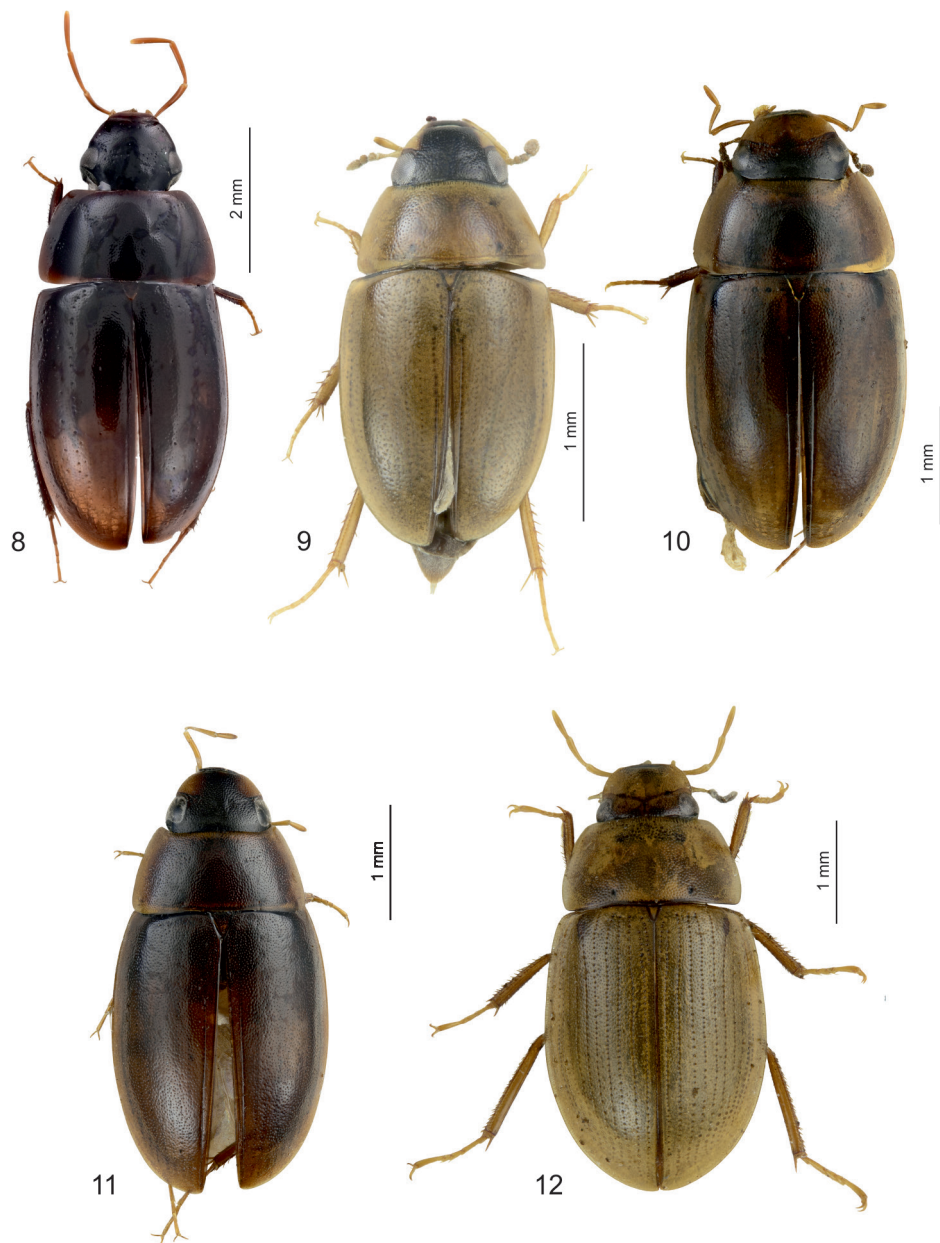
AMERICAN SAMOA: Tutuila Isl.: 24 exs.: Tula, -14.25035° -170.56832°, swampy pond in village, 3 m a.s.l., 10.VIII.2017, leg. G. Wewalka & M. Balke (NMW, ZMS); Aunu'u Isl.: 16 exs.: taro plantation in wetland behind Aunu'u Village, -14.28415° -170.55747°, 4 m a.s.l., 10.VIII.2017, leg. G. Wewalka (NMW); 10 exs.: Faimulivai Marsh (crater marsh), -14.28291° -170.55156°, 2 m a.s.l., 10.VIII.2017, leg. M. Balke (ZSM); Olosega Isl.: 1 ex.: Olosega Village, marsh, 19.X.2017, leg. M.A. Schmaedick (ASCC); Swains Isl.: 3 exs.: in water at lagoon edge, 24.IX.2012, leg. M.A. Schmaedick (ASCC).

SAMOA: Upolu Isl.: 5 exs.: Malua ("Tufulele"), EFKS Fine Art Museum, -13.79972° -171.90424°, 8 m a.s.l., wetland, leg. G. Wewalka & M. Balke (NMW, ZSM); Savai'i Isl.: 1 ex.: ca. 4 km NW Pu'apu'a, -13.55271° -172.23807°, ca. 10 m a.s.l., puddle on gravel with grass mats, 17.XIII.2017, leg. G. Wewalka (NMW).

IDENTIFICATION: Habitus as in Fig. 9.

HABITAT: The specimens were found in a grassy wetland (Fig. 18), a swampy pond (Fig. 20), in a crater marsh (Fig. 21), a taro plantation (Fig. 22), in water at a lagoon edge, and in a puddle on gravel with grass mats.

DISTRIBUTION: Eastern Palearctic Region, Oriental Region, Australian/Oceanian Region: Australia, New Guinea, Solomon Islands, Vanuatu, New Caledonia, Fiji, Samoa (Savai'i Isl., Upolu Isl.), American Samoa (first record) (Aunu'u Isl., Olosega Isl., Swains Isl., Tutuila Isl.) (Fig. 16), Society Islands.



Figs. 8–12: Habitus of 8) *Crephelochares* sp. (Samoa, Upolu Isl.), 9) *Enochrus esuriens* (Samoa, Upolu Isl.), 10) *E. maculiceps* (Samoa, Upolu Isl.), 11) *E. ? nigropiceus* (American Samoa, Aunu'u Isl.), 12) *Helochares simulator* (Samoa, Upolu Isl.).

***Enochrus (Methydrus) maculiceps* (MACLEAY, 1871)**

Enochrus (Methydrus) maculiceps: WATTS 1998: 151 (taxonomic revision); HANSEN 1999: 183 (world catalogue); SHORT 2010: 307 (New Caledonia).

Enochrus (Lumetus) bryani ORCHYMONT 1927: 32 (original description, Samoa: “Savai’i: Salailua”); ORCHYMONT 1937: 151 (Oceania, Samoa: “Savai’i”); BALFOUR-BROWNE 1945: 118 (Oceania, Samoa: “Savai’i”); WATTS 1998: 151 (synonymy).

TYPE LOCALITIES: *E. maculiceps*: Australia (Queensland); *E. bryani*: Samoa (Savai’i: Salailua).

SAMOAN MATERIAL EXAMINED:

SAMOA: Upolu Isl.: 1 ex.: Cross Island Road, 1 km S of pass, -13.93091° -171.77948°, ca. 700 m a.s.l., small ditch at creek margin, 31.VII.2017, leg. G. Wewalka (NMW); 4 exs.: 2.3 km NNW Lake Lanoto’o, -13.88870° -171.83203°, 380 m a.s.l., creek, 4.VIII.2017, leg. M. Balke (ZSM); 2 exs.: Lake Lanoto’o, -13.91041° -171.82576°, 770 m a.s.l., 5./21.VIII.2017, leg. M. Balke (ZSM); 3 exs.: Malololelei, -13.96219° -171.76786°, 260 m a.s.l., 7./12./15.VIII.2017, leg. M. Balke (ZSM).

IDENTIFICATION: Habitus as in Fig. 10.

HABITAT: The specimens were found in a ditch, in a creek, and at the edge of a crater lake (Fig. 19).

DISTRIBUTION: Australia, Vanuatu, New Caledonia, Samoa (Savai’i Isl., Upolu Isl.) (Fig. 16).

[*Enochrus (Methydrus) natalensis* (GEMMINGER & HAROLD, 1868)]

Enochrus (Methydrus) natalensis: HANSEN 1999: 184 (world catalogue, “Western Samoa (Bameul, L.c.)”).

Enochrus (Methydrus) parvulus ([sensu] KUWERT, 1888): ORCHYMONT 1927: 33 (Oceania, Samoa: “Upolu: Tafua Volcano (H. Swale), 1917; Apia (Swezey und Wilder)”); ORCHYMONT 1937: 151 (Samoa: “Upolu”).

Enochrus (Lumetus) parvulus (KUWERT): BALFOUR-BROWNE 1945: 118 (Oceania, “Samoa: Upolu (d’Orchymont)”).

Enochrus parvulus (KUWERT, 1890): KAMI & MILLER 1998: 18 (Samoa checklist).

TYPE LOCALITY: South Africa.

COMMENTS: *Enochrus natalensis* has not been treated by WATTS (1998) or by SHORT (2010).

The records from Upolu are based on 12 specimens, which were identified as “*Enochrus (Methydrus) parvulus* Kuwert, 1888 (*nec* Reiche, 1856)” by ORCHYMONT (1927: 33). However, according to BALFOUR-BROWNE (1945: 129–130, fig. 4), who provided line drawings of the aedeagi of specimens from the Indian Ocean and the Pacific Ocean, the Samoan specimens in fact belong to *E. esuriens*: “I think it is very probable that Knisch’s specimens from Samoa identified as *E. esuriens* [sic] and regarded as *E. parvulus* [= *E. natalensis*] by d’Orchymont are actually this species [*E. esuriens*] and I have accordingly transferred the synonymy”.

We assume that the specimens identified as *Enochrus parvulus* or *E. natalensis* actually refer to *E. esuriens*, but a final clarification would require a thorough taxonomic revision of the species involved.

DISTRIBUTION (of *E. natalensis*, according to HANSEN 1999: 184, and PRZEWOŻNY 2022: 25): From southern Europe and North Africa through the Afrotropical and Oriental regions to Australia.

***Enochrus (Methydrus) ? nigropiceus* (MOTSCHULSKY, 1861)**

Enochrus (Lumetus) nigropiceus: HANSEN 1999: 185 (world catalogue).

Enochrus (Lumetus) cheesmanae BALFOUR-BROWNE, 1939: SHORT 2010: 310 (synonymy, taxonomy).

Enochrus (Methydrus) nigropiceus: SHORT 2010: 310 (taxonomy).

TYPE LOCALITY: *E. nigropiceus*: Sri Lanka (Colombo); *E. cheesmanae*: Vanuatu (Malekula Island, Malua Bay).

SAMOAN MATERIAL EXAMINED:

AMERICAN SAMOA: Aunu'u Isl.: 1 ♀: taro plantation in wetland behind Aunu'u Village, -14.28415° -170.55747°, 4 m a.s.l., 10.VIII.2017, leg. G. Wewalka (NMW).

IDENTIFICATION: Habitus as in Fig. 11.

COMMENTS: This species, as currently delineated, is in need of taxonomic revision. Possibly, it represents a complex of several similar species, as indicated by the patchy distribution.

HABITAT: The single specimen was found in a taro plantation in the lowland (Fig. 22).

DISTRIBUTION (of *E. nigropiceus*, acc. to SHORT 2010): Oriental Region, Vanuatu (type locality of *E. cheesmanae*). If the single female from Aunu'u Island (see Fig. 17) really belongs to *E. nigropiceus*, this would be the first record for the Samoan Archipelago.

[*Enochrus (Methyrus) ? tritus* (BROUN, 1880)]

Enochrus (Lumetus) ? tritus: ORCHYMONT 1927: 31 (Samoa: "Upolu, Tafua Volcano"); ORCHYMONT 1937: 151 (Oceania, Samoa: "Upolu (A. d'Orchymont)").

Enochrus (Lumetus) tritus: BALFOUR-BROWNE 1945: 118, 131 (Oceania, Samoa: "Upolu (d'Orchymont)").

Enochrus tritus: KAMI & MILLER 1998: 18 (Samoa checklist).

Enochrus (Lumetus) "[? Methyrus]" tritus: HANSEN 1999: 196 (world catalogue, "Samoa").

Enochrus (Methyrus) tritus: SHORT 2010: 311 (taxonomy).

TYPE LOCALITY: New Zealand.

COMMENTS: The record from Samoa is based on ORCHYMONT (1927): "A specimen from Upolu, Tafua Volcano, 1917 (Dr. H. Swale: in coll. Brit. Mus.), perhaps a ♀, as the claws are not hooked, seems very near to, if not identical with, *E. tritus* Broun, of New Zealand. ...".

According to SHORT (2010: 312), "this species [*E. tritus*] is likely a synonym or geographical variant of *E. elongatulus*", described by MACLEAY (1871) from Australia.

In any case, the record of *E. tritus* from Samoa is to be regarded as highly doubtful. The true identity of the single female recorded by ORCHYMONT (1927) cannot be clarified without a comprehensive taxonomic revision.

DISTRIBUTION: According to HANSEN (1999: 197), it occurs in New Zealand, the Cook Islands, Samoa, and the Society Islands.

***Helochaeres (s.str.) simulator* KNISCH, 1922**

Helochaeres (Hydrobaticus) simulator: ORCHYMONT 1937: 151 (Oceania); BALFOUR-BROWNE 1945: 117 (Oceania); SHORT 2010: 313 (taxonomy, Oceania, Samoa); HANSEN 1999: 171 (world catalogue).

Helochaeres (s.str.) simulator: GIRÓN & SHORT 2021: 196 (taxonomy, distribution).

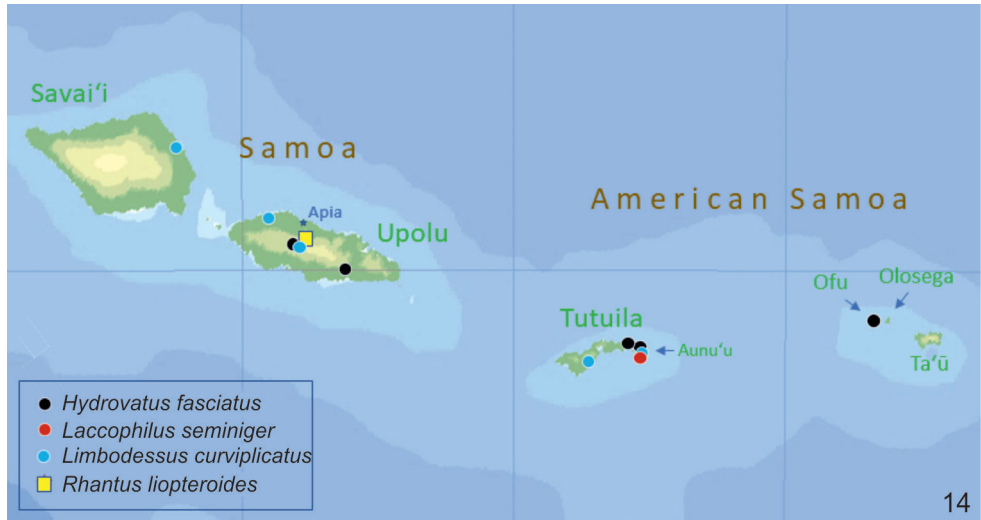
TYPE LOCALITY: Papua New Guinea (Bismarck Archipelago).

SAMOAN MATERIAL EXAMINED:

AMERICAN SAMOA: Tutuila Isl.: 1 ex., Malaeimi, behind American Samoa Community College, -14.31983° -170.74293°, 60–90 m a.s.l., creek in disturbed forest, 7./8.VIII.2017, leg. M. Balke (ZSM); 24 exs.: Malaeimi, -14.31104° -170.74863°, 260 m a.s.l., creek in disturbed forest, 8.VIII.2017, leg. M. Balke (ZSM); 2 exs.: A'oloua, -14.31104° -170.78235°, 400 m a.s.l., ditch in disturbed forest, 9.VIII.2017, leg. M. Balke (ZSM); 10 exs.: Tula, -14.25035° -170.56832°, 3 m a.s.l., swampy pond in village, 10.VIII.2017, leg. G. Wewalka & M. Balke (NMW, ZSM); Aunu'u Isl.: 2 exs.: Faimulivai Marsh (crater marsh), -14.28291° -170.55156°, 2 m a.s.l., 10.VIII.2017, leg. M. Balke (ZSM); Olosega Isl.: 5 exs.: Olosega Village, marsh, 19.X.2017, leg. M.A. Schmaedick (ASCC).



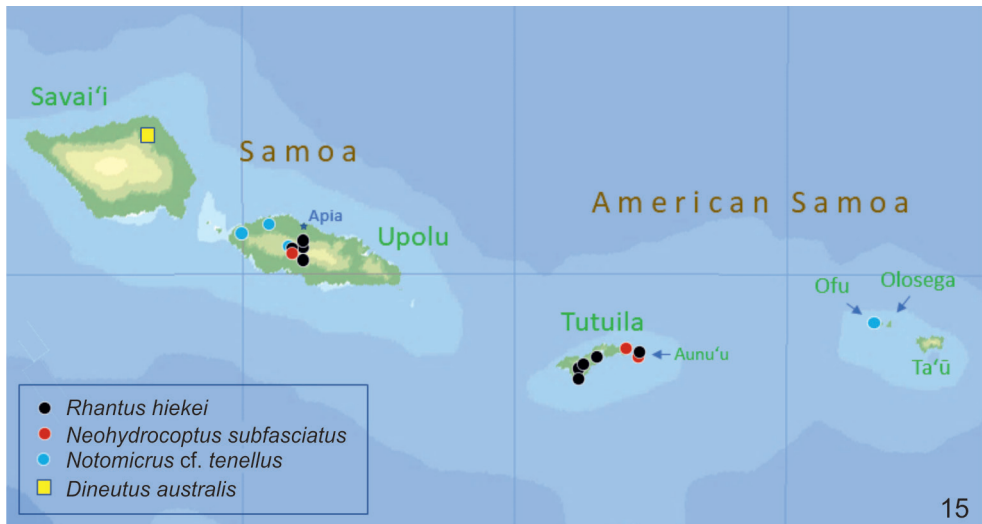
13



14

Fig. 13: Distribution of *Copelatus marginatus*, *Cybister tripunctatus temnenkii*, *Hydaticus consanguineus*, and *H. rhanaticoides* in the Samoan Archipelago.

Fig. 14: Distribution of *Hydrovatus fasciatus*, *Laccophilus seminiger*, *Limbodessus curviplicatus*, and *Rhantus liopteroides* in the Samoan Archipelago.



15



16

Fig. 15: Distribution of *Rhantus hiekei*, *Neohydrocoptus subfasciatus*, *Notomicrus cf. tenellus*, and *Dineutus australis* in the Samoan Archipelago.

Fig. 16: Distribution of *Crephelochares* sp., *Enochrus esuriens*, and *E. maculiceps* in the Samoan Archipelago.



Fig. 17: Distribution of *Enochrus ? nigropiceus*, and *Helochaeres simulator* in the Samoan Archipelago.

SAMOA: Upolu Isl.: 22 exs.: Lake Lanoto'o, -13.91041° -171.82576°, 770 m a.s.l., 5./21.VIII.2017, leg. G. Wewalka & M. Balke (NMW, ZSM); 3 exs.: Malua ("Tufulele"), EFKS Fine Art Museum, -13.79972° -171.90424°, 8 m a.s.l., wetland, 22.VIII.2017, leg. G. Wewalka & M. Balke (NMW, ZSM); Savai'i Isl.: 4 exs.: ca. 4 km NW Pu'apu'a, -13.55271° -172.23807°, ca. 10 m a.s.l., puddle on gravel with grass mats, 17.VIII.2017, leg. G. Wewalka (NMW).

IDENTIFICATION: Habitus as in Fig. 12. The specimens examined show remarkable differences in body size, a fact already indicated by SHORT (2010).

HABITAT: The specimens were found at elevations from 2–770 m a.s.l. in a grassy wetland (Fig. 18), in a lake (Fig. 19), a swampy pond (Fig. 20), in marshes (Fig. 21), a ditch, and in creeks in disturbed forest, and in a puddle with gravel and grass mats.

DISTRIBUTION: Papua New Guinea, Fiji, Tonga, Samoa (Savai'i Isl., Upolu Isl.), American Samoa (first record) (Aunu'u Isl., Olosega Isl., Tutuila Isl.) (Fig. 17).

Preliminary checklist of the Gyrinidae, Dytiscidae, Noteridae, and Hydrophilidae (excl. Sphaeridiinae) of the Samoan Archipelago

Species recorded from the Samoan Archipelago based solely on doubtful or unconfirmed historical records, are placed between square brackets. Species in **bold** are presumably endemic to the Samoan Archipelago. Taxa recorded for the first time from the Samoan Archipelago are underlined. AS = American Samoa; S = Independent State of Samoa; asterisks (*) denote first records for AS and/or S.

GYRINIDAE

Dineutus (Cyclous) australis (FABRICIUS, 1775) S*

DYTISCIDAE

Copelatus marginatus SHARP, 1882 AS*, S

Cybister tripunctatus temnenkii AUBÉ, 1838 AS*, S

Hydaticus consanguineus AUBÉ, 1838 AS*, S

[<i>Hydaticus rhantaticoides</i> RÉGIMBART, 1892]	S
<u><i>Hydrovatus fasciatus</i> SHARP, 1882</u>	AS*, S*
<u><i>Laccophilus seminiger</i> FAUVEL, 1883</u>	AS*
<i>Limbodessus curvuplicatus</i> (ZIMMERMANN, 1927)	AS*, S
<i>Rhantus hiekei</i> BALKE, 1993	AS*, S
<i>Rhantus liopteroides</i> ZIMMERMANN, 1927	S

NOTERIDAE

<u><i>Neohydrocoptus subfasciatus</i> (SHARP, 1882)</u>	AS*, S*
<i>Notomicrus</i> cf. <i>tenellus</i> CLARK, 1863	AS*, S

HYDROPHILIDAE (excl. Sphaeridiinae)

<u><i>Crephelelochaes</i> sp.</u>	S*
<i>Enochrus</i> (<i>Methydus</i>) <i>esuriens</i> (WALKER, 1858)	AS*, S
<i>Enochrus</i> (<i>Methydus</i>) <i>maculiceps</i> (MACLEAY, 1871)	S
[<i>Enochrus</i> (<i>Methydus</i>) <i>natalensis</i> (GEMMINGER & HAROLD, 1868)]	S
<u><i>Enochrus</i> (<i>Methydus</i>) ? <i>nigropiceus</i> (MOTSCHULSKY, 1861)</u>	AS*
[<i>Enochrus</i> (<i>Methydus</i>) ? <i>tritus</i> (BROUN, 1880)]	S
<i>Helochaes</i> (s.str.) <i>simulator</i> KNISCH, 1922	AS*, S

Conclusions

The water beetle fauna of the Samoan Archipelago is still not satisfactorily explored due to insufficient sampling, lack of modern taxonomic revisions, and/or lack of molecular data.

Based on our studies, we confirm the presence of 16 species of aquatic Coleoptera in the Samoan Archipelago: one Gyrinidae, eight Dytiscidae, two Noteridae and five aquatic Hydrophilidae. First records for the Samoan Archipelago are provided for one family (Gyrinidae), one genus (*Crephelelochaes*, Hydrophilidae) and six species (one Gyrinidae, two Dytiscidae, one Noteridae, and two Hydrophilidae). Three species (19%) are probably endemic to the Samoan Archipelago. Fourteen species are known from the Independent State of Samoa and 12 from American Samoa.

Four species are recorded from the Independent State of Samoa for the first time (one Gyrinidae, one Dytiscidae, one Noteridae, and one Hydrophilidae), while 12 species are recorded from the hitherto very poorly explored American Samoa for the first time (seven Dytiscidae, two Noteridae, three Hydrophilidae).

Rhantus liopteroides, described by ZIMMERMANN (1927) from Samoa (Upolu Island) could not be found during the field survey in 2017 carried out by M. Balke, M.A. Schmaedick & G. Wewalka. This endemic species has not been collected since almost hundred years (May 1924). *Copelatus marginatus* has not been collected in the Samoan Archipelago since 1964.

Three species could not be identified unambiguously: *Notomicrus* cf. *tenellus* (Noteridae), *Crephelelochaes* sp. and *Enochrus* ? *nigropiceus* (Hydrophilidae).



Fig. 18: Samoa, Upolu Isl., Malua, wetland near EFKS Fine Art Museum: *Limbodessus curviplicatus*, *Notomicrus* cf. *tenellus*, *Enochrus esuriens*, *Helochaeres simulator*, *Hydraena* sp. Photograph by M. Balke.

Fig. 19: Samoa, Upolu Isl., Lake Lanoto'o: *Cybister tripunctatus temnenkii*, *Hydrovatus fasciatus*, *Limbodessus curviplicatus*, *Rhantus hiekei*, *Neohydrocoptus subfasciatus*, *Notomicrus* cf. *tenellus*, *Crephelochaeres* sp., *Enochrus maculiceps*, *Helochaeres simulator*, *Hydraena* sp. Photograph by G. Wewalka.



Fig. 20: American Samoa, Tutuila Island, Tula, swampy pond: *Cybister tripunctatus temnenkii*, *Hydaticus consanguineus*, *Hydrovatus fasciatus*, *Neohydrocoptus subfasciatus*, *Enochrus esuriens*, *Helochaers simulator*. Photograph by M. Balke.

Fig. 21: American Samoa, Aunu'u Isl., Faimulivai Marsh: *Cybister tripunctatus temnenkii*, *Hydaticus consanguineus*, *Hydrovatus fasciatus*, *Laccophilus seminiger*, *Limbodessus curvuplicatus*, *Neohydrocoptus subfasciatus*, *Enochrus esuriens*, *Helochaers simulator*. Photograph by M. Balke.



Fig. 22: American Samoa, Aunu'u Isl., taro plantation behind Aunu'u Village, with M. Meredith (ASCC): *Hydrovatus fasciatus*, *Enochrus esuriens*, *E. ? nigropiceus*. Photograph by G. Wewalka.

The occurrence of three species recorded from the Samoan Archipelago by earlier authors could not be confirmed: *Hydaticus rhantaticoides* (Dytiscidae), *Enochrus natalensis* and *E. ? tritus* (Hydrophilidae). The record of the two latter species is probably based on misidentification.

The Hydraenidae collected during the 2017 survey shall be published in a forthcoming paper.

The water beetle fauna of the Samoan Archipelago is, logically, less diverse than that of New Caledonia or Fiji (see JÄCH & BALKE 2010). This is most likely due to the relatively young age of the Samoan Islands and their great distance to potential source areas.

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References

- BALFOUR-BROWNE, J. 1945: Aquatic Coleoptera of Oceania (Dytiscidae, Gyrinidae, and Palpicornia). – Occasional papers of Bernice P. Bishop Museum XVIII (7): 103–132.
- BALKE, M. 1993: Taxonomische Revision der pazifischen, australischen und indonesischen Arten der Gattung *Rhantus* Dejean, 1833 (Coleoptera: Dytiscidae). – Koleopterologische Rundschau 63: 39–84. https://www.zobodat.at/pdf/KOR_63_1993_0039-0084.pdf
- BALKE, M. 2001: Biogeography and classification of New Guinean Colymbetini (Coleoptera: Dytiscidae: Colymbetinae). – Invertebrate Systematics 15 (2): 259–275.
- BALKE, M., BERGSTEN, J., WANG, L.J. & HENDRICH, L. 2017: A new genus and two new species of Southeast Asian Bidessini as well as new synonyms for Oceanian species (Coleoptera, Dytiscidae). – Zookeys 647: 137–151. <https://doi.org/10.3897/zookeys.647.11231>
- BALKE, M. & RIBERA, I. 2004: Jumping across Wallace's line: *Allodessus* Guignot and *Limbodessus* Guignot revisited (Coleoptera: Dytiscidae, Bidessini) based on molecular-phylogenetic and morphological data. – Australian Journal of Entomology 43: 114–128.
- BALKE, M., WEWALKA, G., ALARIE, Y. & RIBERA, I. 2007: Molecular phylogeny of Pacific Island Colymbetinae: radiation of New Caledonian and Fijian species (Coleoptera, Dytiscidae). – Zoologica Scripta 36 (2): 173–200.
- BISTRÖM, O. 1997: Taxonomic revision of the genus *Hydrovatus* Motschulsky (Coleoptera, Dytiscidae). – Entomologica Basiliensia 19 (1996): 57–584.
- BRANCUCCI, M. 1983: Révision des espèces est-paléarctiques, orientales et australiennes du genre *Laccophilus* (Col. Dytiscidae). – Entomologische Arbeiten aus dem Museum G. Frey 31/32: 241–426.
- BUXTON, P.A. 1935: Summary. – In: Insects of Samoa and other Samoan terrestrial Arthropoda IX (2). – London: British Museum, pp. 33–104.
- FRIEDERICH, K. 1922: Die von Dr. K. Friederichs in Samoa und Indochina gesammelten Käfer. – Archiv für Naturgeschichte (A) 88 (10): 147–159.
- GIRÓN, J.C. & SHORT, E.A.Z. 2021: The Acidocerinae (Coleoptera, Hydrophilidae): taxonomy, classification, and catalog of species. – ZooKeys 1045: 1–236. https://journals.scholarsportal.info/pdf/13132989/v1045inone/1_tachtacacos.xml_en
- HANSEN, M. 1999: Hydrophiloidea (Coleoptera). – In Hansen, M. (ed.): World Catalogue of Insects. Vol. 2. – Stenstrup: Apollo Books, 416 pp.
- HENDRICH, L., BALKE, M. & WEWALKA, G. 2010: DYTISCIDAE: Annotated checklist of the Bidessini, Hydrovatini, Hyphyrini, Laccophilinae and Dytiscinae (Coleoptera), pp. 171–194. – In Jäch, M.A. & Balke, M. (eds.): Water beetles of New Caledonia (part 1). – Monographs on Coleoptera 3: I–IV + 1–449 pp. https://www.zobodat.at/pdf/Monographs-Col_3_0171-0194.pdf
- JÄCH, M.A. & BALKE, M. 2010: Introduction, pp. 1–29. – In Jäch, M.A. & Balke, M. (eds.): Water beetles of New Caledonia (part 1). – Monographs on Coleoptera 3: I–IV + 1–449 pp. https://www.zobodat.at/pdf/Monographs-Col_3_0001-0029.pdf
- KAMI, K.S. & MILLER, S.E. 1998: Samoan insects and related arthropods: Checklist and bibliography. – Bishop Museum Technical Report 13: i–v, 1–121. <https://repository.si.edu/handle/10088/3484>
- KNISCH, A. 1922: Hydrophilidae, pp. 151–152. – In Friederichs, K. (ed.): Die von Dr. K. Friederichs in Samoa und Indochina gesammelten Käfer. – Archiv für Naturgeschichte (A) 88 (10): 147–159.
- KOPPERS, A.A.P., RUSSELL, J.A., JACKSON, M.G., KONTER, J., STAUDIGEL, H. & HART, S.R. 2008: Samoa reinstated as a primary hotspot trail. – Geology 36 (6): 435–438. <https://doi.org/10.1130/G24630A.1>

- MACLEAY, W. 1871: Notes on a collection of insects from Gayndah. – Transactions of the Entomological Society of New South Wales II [1867–1873]: 79–205. [the second part of this article, pp. 239–318, was probably published in 1872, because the society session at which the manuscript was presented (read and discussed) was held on December 4 1871]
- MAZZOLDI, P. 2010: GYRINIDAE (Coleoptera), pp. 31–43. – In Jäch M.A. & Balke M. (eds.): Water beetles of New Caledonia (part 1). – Monographs on Coleoptera 3: I–IV + 1–449 pp. https://www.zobodat.at/pdf/Monographs-Col_3_0031-0043.pdf
- NILSSON, A.N. 2011: A world catalogue of the family Noteridae (Coleoptera, Adephaga). Version 16.VIII.2011, 54 pp. http://www.waterbeetles.eu/documents/W_CAT_Noteridae.pdf
- NILSSON, A. & HÁJEK, J. 2023: A world catalogue of the family Dytiscidae, or the diving beetles (Coleoptera, Adephaga). Version 1. I. 2023, 319 pp. http://www.waterbeetles.eu/documents/W_CAT_Dytiscidae_2023.pdf
- NUNN, P.D. 1998: Pacific island landscapes: landscape and geological development of southwest Pacific Islands, especially Fiji, Samoa and Tonga. – Suva: Institute of Pacific Studies, University of the South Pacific, 318 pp.
- ORCHYMONT, A. d' 1927: Hydrophilidae, pp. 29–34. – In: Insects of Samoa and other terrestrial Samoan Arthropoda IV (1). – London: British Museum, 66 pp.
- ORCHYMONT, A. d' 1937: Check list of the Palpicornia of Oceania (Coleoptera: Polyphaga). – Occasional Papers of Bernice P. Bishop Museum XIII (1): 147–160.
- PRZEWOŹNY, M. 2022: Catalogue of Palearctic Hydrophiloidea (Coleoptera). Internet version 2022-01-01, 60 pp. http://www.waterbeetles.eu/documents/PAL_CAT_Hydrophiloidea_2022.pdf
- SHORT, A.E.Z. 2010: HYDROPHILIDAE: Review of the subtribe Acidocerina of the Southwest Pacific islands (Coleoptera), pp. 297–318. – In Jäch, M.A. & Balke, M. (eds.): Water beetles of New Caledonia (part 1). – Monographs on Coleoptera 3: I–IV + 1–449 pp. https://www.zobodat.at/pdf/Monographs-Col_3_0297-0318.pdf
- TOLEDO, M. 2010: NOTERIDAE: Review of the species occurring east of the Wallace line (Coleoptera), pp. 195–236. – In Jäch, M.A. & Balke, M. (eds.): Water beetles of New Caledonia (part 1). – Monographs on Coleoptera 3: I–IV + 1–449 pp. https://www.zobodat.at/pdf/Monographs-Col_3_0195-0236.pdf
- WATTS, C.H.S. 1998: Revision of Australian *Enochrus* Thomson (Coleoptera: Hydrophilidae). – Records of the South Australian Museum 30 (2): 137–156.
- WEWALKA, G. 1979: Revision der Artengruppe des *Hydaticus* (*Guignotites*) *fabricii* (Mac Leay), (Col., Dytiscidae). – Koleopterologische Rundschau 54: 119–139. https://www.zobodat.at/pdf/KOR_54_1979_0119-0139.pdf
- WEWALKA, G. 2015: Revision of the *Hydaticus* (*Prodaticus*) *sexguttatus* species group, and resembling species from the Palearctic, Oriental, Australian and Pacific Regions (Coleoptera: Dytiscidae). – Koleopterologische Rundschau 85: 7–55. https://www.zobodat.at/pdf/KOR_85_2015_0007-0055.pdf
- WEWALKA, G. 2023: Review of the *Hydaticus fabricii* group and the newly established *H. grammicus* group (Coleoptera: Dytiscidae). – Koleopterologische Rundschau 92 [2022]: 1–72. https://www.zobodat.at/pdf/KOR_92_2023_0001-0072.pdf
- WEWALKA, G., BALKE, M. & HENDRICH, L. 2010: DYTISCIDAE: Copelatinae (Coleoptera), pp. 45–128. – In Jäch, M.A. & Balke, M. (eds.): Water beetles of New Caledonia (part 1). – Monographs on Coleoptera 3: I–IV + 1–449 pp. https://www.zobodat.at/pdf/Monographs-Col_3_0045-0128.pdf
- WEWALKA, G., JÄCH, M.A. & MANUEL, M. 2023: An update on the diving beetles and burrowing water beetles of New Caledonia, with description of ten new species (Coleoptera: Dytiscidae, Noteridae). – Koleopterologische Rundschau 93: 245–320.

- WHISTLER, W.A. 2002: The Samoan rainforest: A guide to the vegetation of the Samoan Archipelago. – Honolulu: Isle Botanica, 169 pp.
- ZIMMERMANN, A. 1927: Dytiscidae, pp. 15–19. – In: Insects of Samoa and other terrestrial Samoan Arthropoda IV (1). – London: British Museum, 66 pp.

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