

Remarks on Salticidae (Aranei) from Hawaii, with description of *Havaika* gen.n.

Заметки от пауках-скакунчиках (Aranei: Salticidae) Гавайских островов, с описанием *Havaika* gen.n.

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КЛЮЧЕВЫЕ СЛОВА: Aranei, Salticidae, новый род, новые виды, Гавайские о-ва, Маркизовы о-ва.

“ This paper is dedicated to Dr and Mrs J. W. Berry,
who for over 20 years collected spiders in Pacific Islands,
and thanks to their support and hospitality
the Author was able to study the Pacific *Salticidae*.”

ABSTRACT. Diagnostic drawings and remarks on genera of Salticidae, first time reported from Hawaii, or forgotten, are provided. A new genus *Havaika* gen.n. (previously misclassified to Australian *Sandalodes* Keyserling, 1883), endemic to Hawaii and Marquesas is delimited and its relationship with some other genera are discussed. *Havaika* gen.n. contains 12 species, whose genitalic organs are illustrated. One species *H. jamiesoni* sp.n. is described as a new for science.

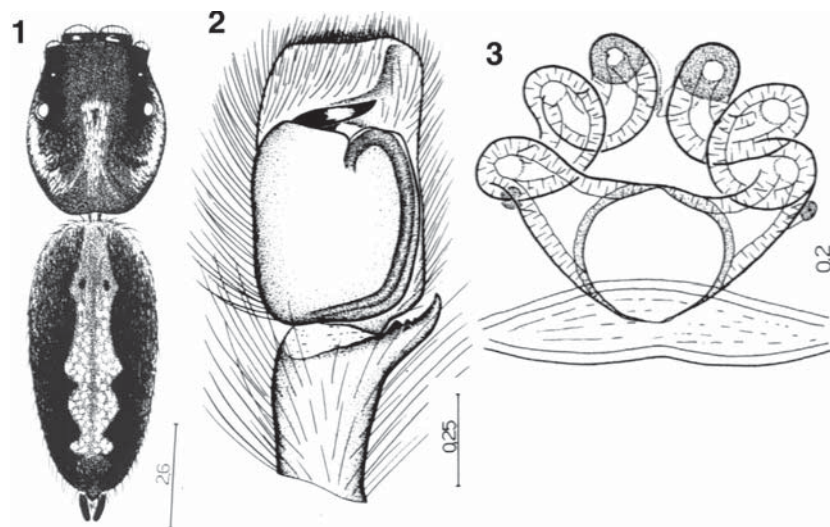
РЕЗЮМЕ. Даны диагностические рисунки и таксономические заметки о родах пауков-скакунчиков, впервые отмеченных в фауне Гавайских о-вов, или забытых. Выделен новый род *Havaika* gen.n. (ранее ошибочно относимый к австралийскому роду *Sandalodes* Keyserling, 1883), эндемичный для Гавайских и Маркизовых о-вов. Обсуждаются его взаимоотношения с некоторыми другими родами скакунчиков. *Havaika* gen.n. включает 12 видов, половые органы которых проиллюстрированы. Дано описание одного нового вида: *H. jamiesoni* sp.n.

Introduction

Fauna of Salticidae of Hawaii is very difficult to identify because it consists of genera whose origin can be traced either to Asia or North America, and that calls for knowledge of very different faunas of these continents. The present paper gives diagnostic drawings and taxonomic remarks of several genera collected in Hawaii during last 100 years and preserved in collections of several Zoological Museums; only a few specimens were recently collected.

A most interesting case is a genus *Havaika* gen.n., endemic to Hawaiian Archipelago, known also from Marquesas, erroneously assigned previously to the Australian genus *Sandalodes* Keyserling, 1883 (Figs 1–3). *Havaika* consists of a cluster of similar looking species, differing by inconspicuous and intergrading characters. Taking into account relative similarity of genital organs, the color pattern seems to be particularly important for species recognition in *Havaika* gen.n. Unfortunately the present paper is limited to study of type specimens, which are faded and partly damaged during long preservation in alcohol (often about 100 years), which make difficult their comparison with fresher specimens. Presentation of detailed genitalic drawings of type specimens of previously known “*Sandalodes*” species will provide base for further research on *Havaika* gen.n., particularly study of color pattern of fresh specimens, and biological observations in the field, which can solve taxonomic difficulties. Unfortunately, recent field observations made by J. W. Berry (personal communication) seem to indicate sharp decline of populations of *Havaika* gen.n. species, which seem to disappear from the Hawaiian Islands.

The present paper is based mainly on material kept in the following collections: personal collections of Dr J. W. Berry (Professor Emeritus's Butler University, Biology Department, Indianapolis), and Dr J. A. Beatty (of Southern Illinois University, Carbondale, Ill.) (JWB); as well as on large collections borrowed from American Museum of Natural History, New York (AMNH), and Bishop Museum in Honolulu, Hawaii (BMHH). Additional specimens came from the following collections: BM — Natural History Museum, British Museum, London, UK; HEC — Hope Entomological



Figs 1–3. Comparison of *Sadalodes bipenicillatus* from Australia, type species of genus *Sandalodes*, into which *Havaika* was previously classified: 1 — general body appearance, 2 — male palpal organ, 3 — and internal structure of epigynum. From Davies, Zabka 1989: 252, table 52 — by courtesy of the Editor of Memoirs of the Queensland Museum, Brisbane, with Authors' permission.

Рис. 1–3. Сравнение *Sadalodes bipenicillatus* из Австралии, типовой вид рода *Sadalodes*, к которому ранее относили род *Havaika*: 1 — общий вид, 2 — палеппус самца, 3 — внутреннее строение эпигины. Из Davies & Zabka, 1989: 252, table 52.

Collections, Oxford University Museum, Oxford, UK; MNHN — Laboratoire de Zoologie (Arthropodes), Muséum National d'Histoire Naturelle, Paris.

The following abbreviations are used in the text: ALE — anterior lateral eyes; AME — anterior median eyes; Eyes I — eyes of the first row; Eyes II — eyes of the second row; Eyes III — eyes of the third row; HC — height of cephalothorax, LA — length of abdomen, LC — length of cephalothorax, LDC — length of flat surface of cephalothorax; LE — length of eye field, MWA — maximal width of abdomen, MWC — maximal width of cephalothorax, WC3 — width of cephalothorax at eyes III, WE1 — distance of external edge of eyes I, WE3 — distance of external edge of eyes III. All measurements are in mm; the relations between the body parts are shown in percentages of the length of cephalothorax; the relations between the length of five segments of legs (tarsus + metatarsus + tibia + patella + femur) are shown in percentages of the length of five segments of leg I.

A computer version of the results documented here, containing all illustrations and preliminary descriptions of the new taxa concerned, although invalid from a nomenclatural point of view, has been available since 1998 on the Internet at: <http://spiders.arizona.edu/main.htm> (see also Prószyński, 2002).

Taxonomic survey

Genus *Havaika* gen.n.

DIAGNOSIS. Jumping spiders of variable size, from 1.98 mm long — smallest species, to 10 mm — the largest; of generalized shape and structure. Male palp of generalized shape (Figs 6–7), with oval bulbus, gently bent embolus and simple, conical tibial apophysis, which may be indistinctly bent or wavy; pedipalpal tibia appears long, usually about equal in length to cymbium, or longer (Figs 41–42). Females epigynum with anterior membranous, white “window”, di-

vided in the middle by sclerotized vaginal roof of shape presumably variable within a species; differing from several similar genera by internal structure, devoid of median sclerotized “loops” (Fig. 24), but not as compact as in *Habronattus* (Fig. 54). Legs formula is I, IV=III, II in both sexes, but in males legs I are distinctly longer, in females only very indistinctly. The genus is endemic to Hawaiian and Marquesas Archipelagoes.

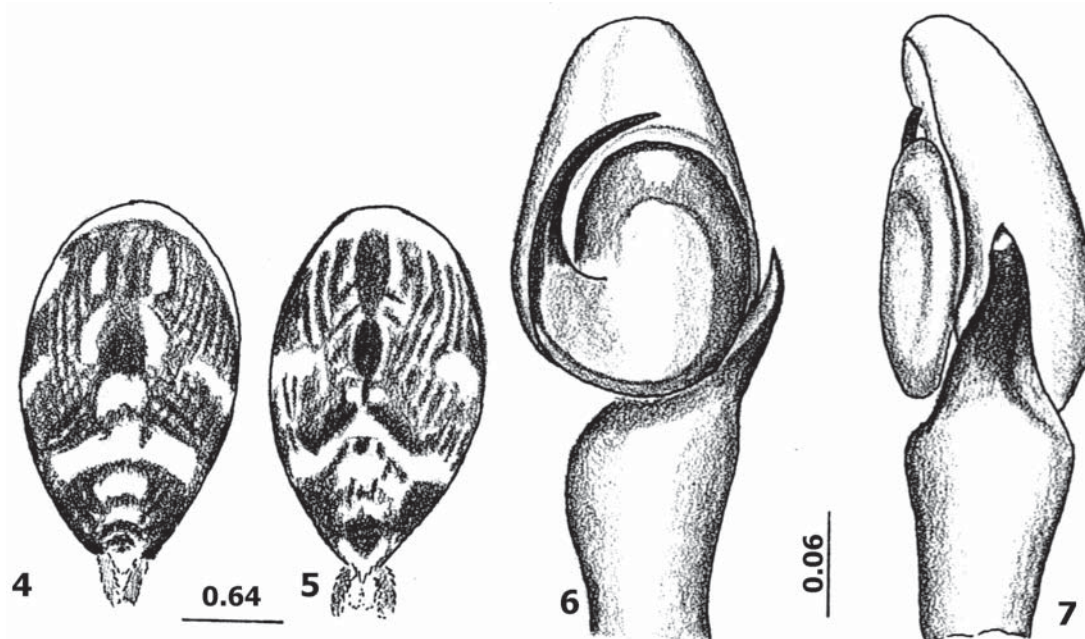
Havaika gen.n. seem closely related to the Old World genera *Bianor* Peckham et Peckham, 1885 (Figs 22–25), *Harmochirus* Simon, 1885 and *Modunda* Simon, 1901 by very similar genital organs (Figs 16–17, 19–20), but distinctly different body shapes (Figs 18, 21). Female genital organs of *Havaika* gen.n. resemble also American genus *Habronattus* F.O. Pickard-Cambridge, 1901 (Fig. 54), and to a lesser degree, by general plan only, *Pellenes* Simon, 1876 (Figs 75–76), whose males are distinctly different. Both latter genera were also discovered on Hawaii, presumably recently imported.

NAME. Modified ancient Polynesian name of Hawaii, actually meaning “Home Land”. For the nomenclatorial purpose the name *Havaika* is considered to be a female gender. Consequently spelling of specific names (epithets) listed below should be changed from male to female gender.

TYPE SPECIES: *Havaika jamiesoni* sp.n.

The following nominal species are congeneric with type species *Havaika jamiesoni* sp.n., and are hereby transferred to the genus *Havaika* gen.n.:

Sandalodes albociliatus Simon, 1900
Sandalodes canosus Simon, 1900
Sandalodes cruciatus Simon, 1900
Sandalodes flavipes Berland, 1933
Sandalodes navatus Simon, 1900
Sandalodes nigrolineatus Berland, 1933
Sandalodes pubens Simon, 1900
Sandalodes seniculus Simon, 1900
Sandalodes triangulifer Berland, 1933



Figs 4-7. Characters of genus *Havaika* — *Havaika jamiesoni* sp.n. from Hawaii, type species of the genus: 4-5 — dorsal view of male (4) and female (5), 6-7 — palpal organ ventrally (6) and laterally (7). Copyright by J. Prószyński.

Рис. 4-7. Признаки рода *Havaika* [*Havaika jamiesoni* sp.n. с Гавайев, типовой вид рода]: 4-5 — дорзально самец (4) и самка (5), 6-7 — палеппус вентрально (6) и латерально (7).

Sandalodes validus Simon, 1900
Sandalodes verecundus Simon, 1900

Species not congeneric with *Havaika* gen.n.:

Sandalodes magnus Berland, 1933 — Holotype ♀ (no locality) = *Plexippus paykulli* (corrected by Berland 1945: 24, confirmed by J. Prószyński in 1998)

Sandalodes rufescens Berland, 1934, belongs apparently to the genus *Habronattus* F.O. Pickard-Cambridge, 1901.

SEPARATION OF HAWAIIAN *HABRONATTUS* FROM *HAVAIIKA* AND PROVISIONAL KEY TO THE TYPES OF *HAVAIIKA*

1. Abdomen with white arrow medially along posterior 1/3rd, setae on clypeus appear particularly dense and long, spermatheca in a form of ovoid, compact, sclerotized brown body, palpal organ with tibia distinctly shorter than cymbium, embolus longer, accompanied by conductor Hawaiian species of *Habronattus*
- Abdomen without white arrow medially along posterior 1/3rd of abdomen, setae on clypeus appear less dense and long; in females spermatheca less sclerotized, less compact, divided into coils and channel; male palpal organ simple, with tibia about equal or longer than cymbium, bulbus oval with single, short embolus genus *Havaika* (males only) 2
- 2(1). Palpal tibia short 3
- Palpal tibia long 4
- 3(2). Embolus longer, basis of embolus in 1/2 of length of bulbus *H. cruciata*, *H. jamiesoni*, *H. navata*
- Embolus shorter, basis of embolus in 1/3 of length of bulbus *H. senicula*, *H. verecunda*
- 4 (1). Basis of embolus in a half length of bulbus — or lower *H. albociliata*, *H. pubens*, *H. valida*,

Havaika jamiesoni sp.n.

Figs. 4-9.

Holotype. (JWB) ♂ (with palpal organ separate in smaller vial), "Havaika A" — Hawaii, Kauai Co., Koke's State Park, Nu'Alolo Trail. Elev. 3600 ft. 23 January 1998. Coll. J.W. & E.R. Berry. Allotype — ♀ (JWB), paratypes — 2 ♂♂ (JWB) — same data, together with holotype.

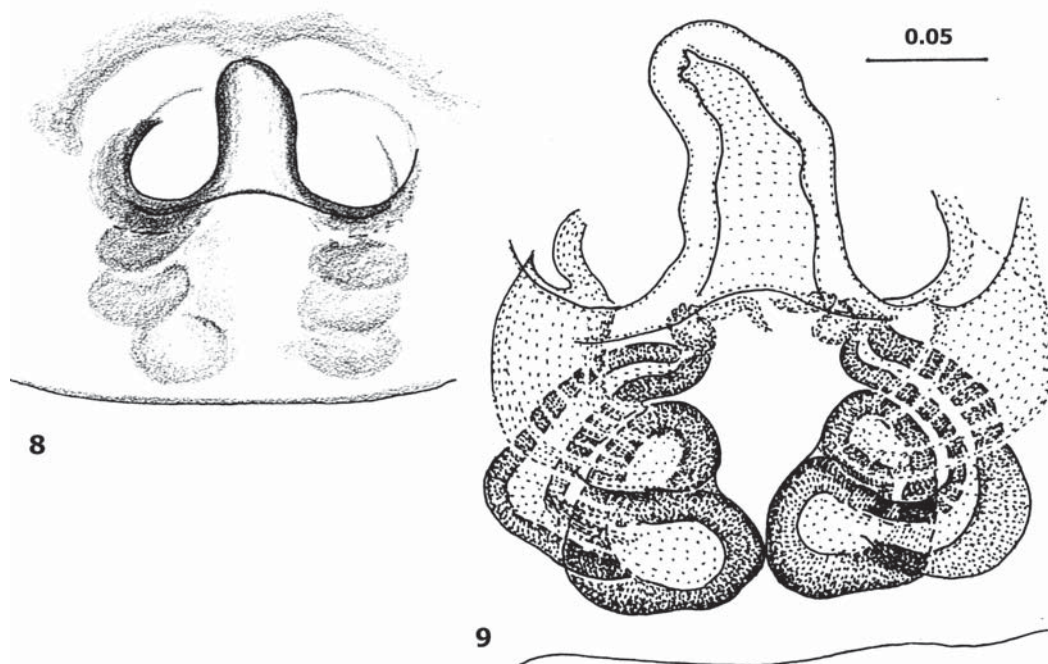
REMARK. Collection of Dr J. W. Berry, as well as collection of AMNH, contain also numerous specimens of *Havaika* of uncertain specific position; because of limited time I had for these study, I left them for next students.

DIAGNOSIS. Medium size species (about 4-5 mm long), male palps with tibia about as long as cymbium, embolus short, arising in about 1/2 of length of bulbus. Abdominal pattern with median streak of pairs of whitish spots and transverse white line in 2/3rd of abdomen. Epigynum — proportions and structure are shown on Figs 8-9. Male seems to be rather similar to *Havaika verecunda*, which has, however, embolus originating at about 1/3 of the length of the bulbus.

DESCRIPTION. *Male*. MEASUREMENTS. Total length 4.44, LC 2.04 (100%), LE 0.96 (47%), HC 0.98 (48%), WE1 1.32 (65%), WE3 1.38 (68%), WC 1.44 (71%), MWC 1.50 (74%), LA 2.40 (118%), MWA 1.32 (65%).

Cephalothorax dark brown, with a pair of indistinct streaks of whitish setae on thorax, and indistinct white setae on eye field. Face dark, with eyes I surrounded by distinct white setae, triangle of white scales dorsally between AME, but no white setae on clypeus. Chelicerae dark, their apical ends lighter, with two or three vertical rows of white setae.

Abdomen dark, indistinctly lighter mottled, with median darker anterior streak delimited by two pairs of whitish elongate spots, followed in posterior half by median chain of whitish rectangular spots. There is a transverse white spot, or



Figs 8–9. Characters of genus *Havaika* — *Havaika jamiesoni* sp.n. from Hawaii, type species of the genus: epigynum (8) and its internal structures (9). Copyright by J. Prószyński.

Рис. 8–9. Признаки рода *Havaika* [*Havaika jamiesoni* sp.n. с Гавайев, типовой вид рода], эпигина (8) и ее внутреннее строение (9).

line, reaching margins of abdomen, in $2/3^{\text{rd}}$ of length of abdomen, the anterior edge of abdomen is marked by thin white line, there is also a pair of marginal, indistinct, whitish spots in the mid-length of abdomen.

Pedipalps with cymbium appearing slightly longer than tibia (in difference to majority of species, where tibia is distinctly longer). Basis of embolus located laterally on bulbus, near the middle of its length (that is difference with *H. verecunda*). Embolus of about the same thickness along majority of its length, gently bent, following curvature of anterior edge of bulbus.

Legs dark, with basal halves of femora II–IV light, anterior tibia, metatarsus and tarsus I brown. Length of segments of legs: I $0.66 + 0.84 + 1.14 + 0.84 + 1.32$, II $0.48 + 0.54 + 0.60 + 0.60 + 0.96$, III $0.48 + 0.72 + 0.66 + 0.60 + 1.20$, IV $0.48 + 0.78 + 0.66 + 0.60 + 1.04$. Legs formula (and length of 5 segments in % of leg I) I (100 %), III (76%) = IV (76%), II (66%).

DESCRIPTION. *Female*. MEASUREMENTS. Total length 4.32, LC 2.04 (100 %), LE 96 (45%), HC .90 (44%), WE1 1.20 (59%), WE3 1.32 (65%), WC 1.38 (68%), MWC 1.38 (68%), LA 2.28 (112%), MWA 1.38 (68%). General appearance resemble male, with somewhat more pronounced light suffusing of the dark abdomen, with transverse white line across abdomen somewhat thinner and chevron resembling. Legs and pedipalps generally lighter, but leg I dark. Length of segments of legs: I $0.48 + 0.48 + 0.72 + 0.72 + 1.08$; II $0.42 + 0.48 + 0.48 + 0.54 + 0.84$, III $0.48 + 0.60 + 0.60 + 0.60 + 1.04$, IV $0.48 + 0.66 + 0.60 + 0.60 + 1.08$. Legs formula I (100 %), III (98%) = IV (98%), II (79%). Epigynum with dark median vaginal roof relatively narrow and long, reaching anterior rim of the membranous “window”. Posterior part of spermathecae narrow and long, running along spherical central part of spermathecae and ending in front of them.

NAME. Named for Mr. Dean Jamieson, a retired entomologist on the island of Kauai in Hawaii who was of great help to the collector, Dr. J. W. Berry, when he was collecting there. Mr Jamieson was instrumental in collecting of many species of *Salticidae* by Dr Berry, by showing all of his favorite collecting places, and participating in collection on many occasions.

Remarks on species transferred to the genus *Havaika*

Havaika albociliata (Simon, 1900), **comb.n.**
Figs 26–27, 28–29, 30–31.

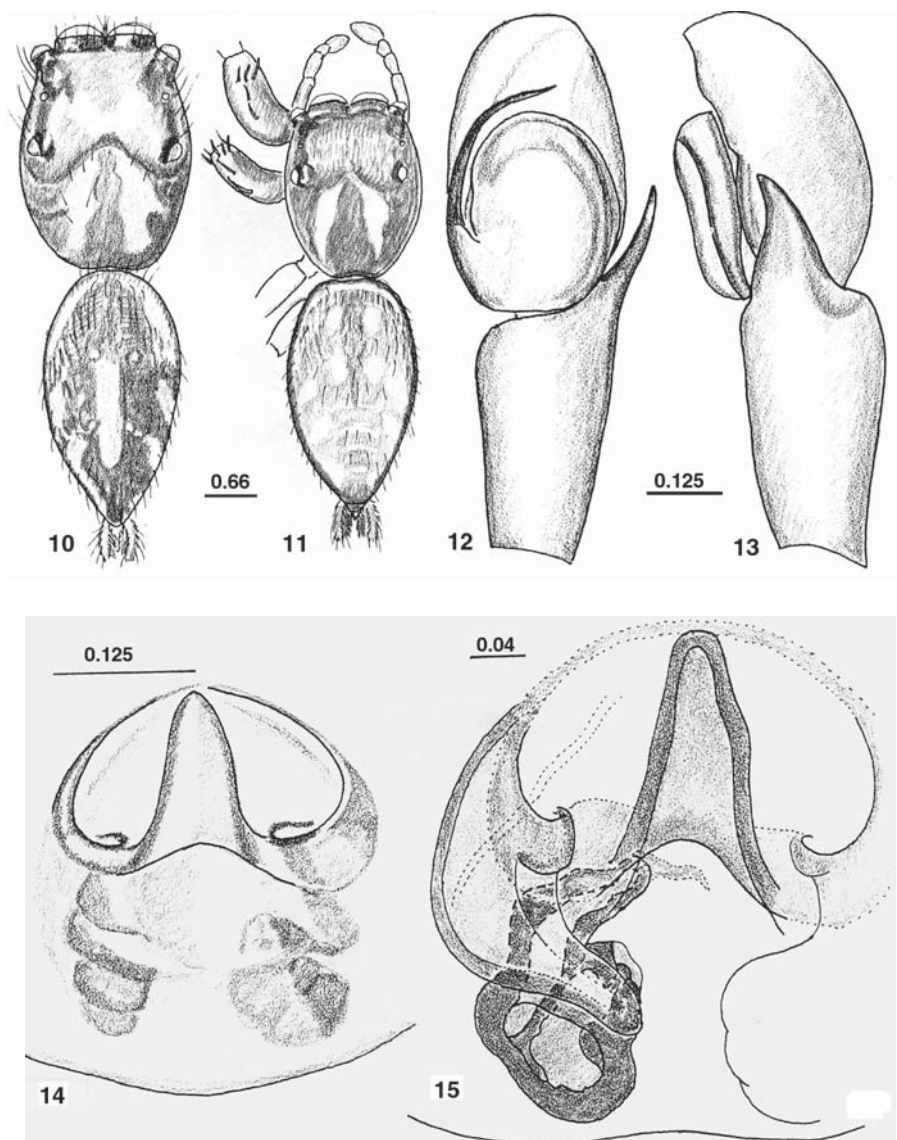
Sandalodes albociliatus Simon, 1900: 514, T.18 F.8

TYPE ♂ (BM) “*Sandalodes albociliatus* Simon, 1900. Mb. Koele, Lanai, 1894, Perkins”, “1904. X. 24: 423–425” (there are in the same vial 2 ♀♀ — not described, but possibly of same species). Specimen in a very bad condition.

6 ♀♀ (BMHH), *Sandalodes albociliatus* Simon, 1900, Hawaii: Lanai, Mts. Lanai, 17-II. 1965. N.L.H. Krauss. [Krauss considered them positively identified with two undescribed females kept with the holotype of *S. albociliatus*) — all from Lanai, Koele Mts].

DIAGNOSIS. Large specimens; in male palpal tibia I about as long as cymbium, bulbus arising near half length of bulbus.

REMARK. Syntype male in a very bad condition. Cephalothorax separate from abdomen; entire anterior surface of chelicere covered with sparse and small, almost invisible whitish setae, eyes surrounded with white dense and longer setae, Abdomen deeply changed, now with remnants of brownish setae.



Figs 10–15. Variation in *Havaika* sp. [specimens from Kalopa St. Park, 2500', among banana leaves, 13 Feb. Collected by J. & B. Berry]; 10–11 — external appearance of female and male, 12–13 — male palpal organ, 14–15 — epigynum and its internal structure. Copyright by J. Prószyński.

Рис. 10–15. Изменчивость *Havaika* sp. [экземпляры из Kalopa St. Park, 2500 футов н.у.м., среди листьев банана, 13 февраля, собрано J. & B. Berry]; 10–11 — внешний вид самца и самки, 12–13 — палеппус самца, 14–15 — эпигина и ее внутреннее строение.

Females chelicerae with prominent white seta/scales, clypeus without white setae.

Some new specimens, otherwise resembling this species, have setae around eyes I reddish or yellowish brown, not very striking, covering of chelicera with white setae/scales of variable intensity.

Females collected by Krauss have clypeus light brown, bald, with a few larger bristles, 3 of which bent upwards, chelicerae brown with a few minute whitish scales basally, and sparse thin, colorless upright setae. Abdominal pattern: anterior margin white, 2 pairs of short, diagonal, lateral white spots, remaining abdomen dark — resembling drawing of *H. pubens*. Larger specimen: length of cephalothorax is 3.12 mm, length of abdomen 4.32 mm.

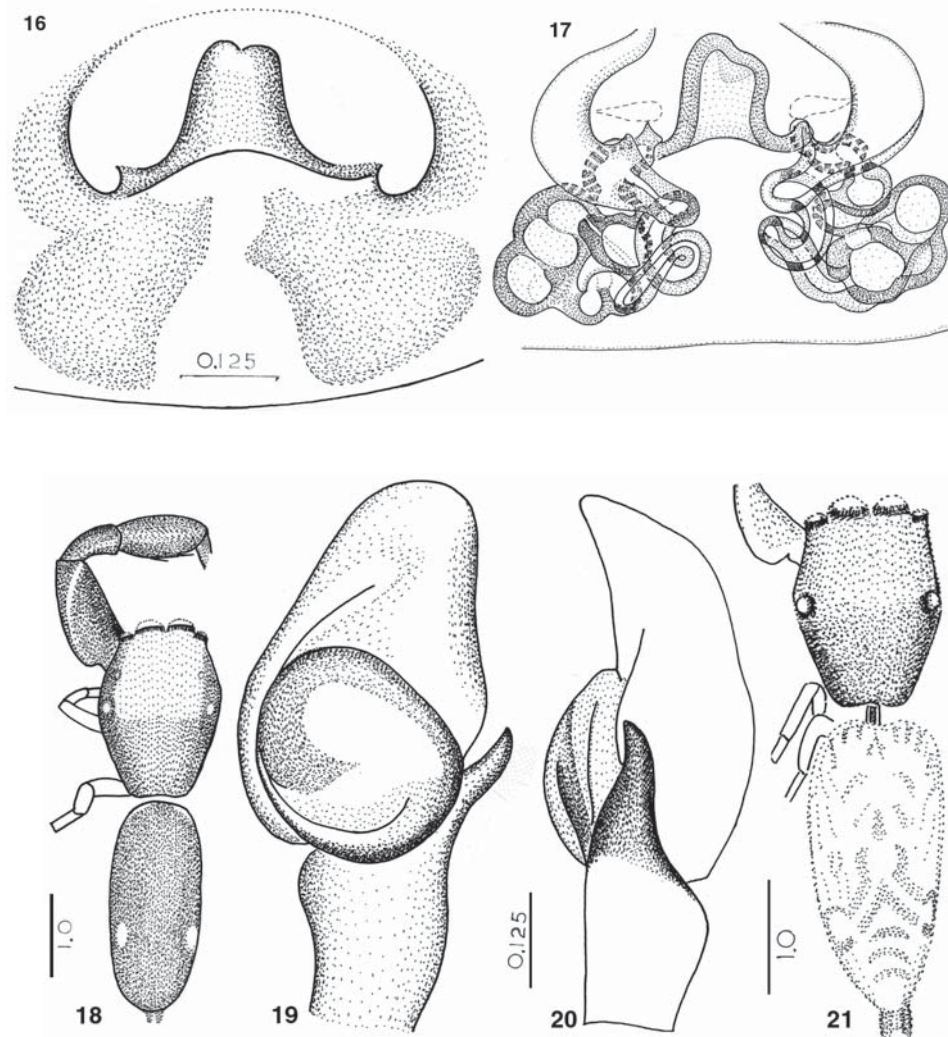
There are numerous specimens possibly of this species in personal collection of Dr J.W. Berry.

Havaika canosa Simon, 1900), **comb.n.**
Figs 32, 33.

Sandalodes canosus Simon, 1900: 515, T. 18 F. 13
Type ♀ (BM), “*Sandalodes canosus* E.S.”, “Haleakala”, “1904. X. 24. 427”.

DIAGNOSIS. A robust spider, dark brown and hairy, with marginal light spots on abdomen, eyes I surrounded reddish brown, clypeus with long brown bristles, chelicerae with dense fur of white setae.

DESCRIPTION. Female. **MEASUREMENTS.** LC 4.08 mm, LE 41%, HC 41%, WE1 59%, WE3 62%, WC3 79%, MWC 79%, LA 113%, LA 113%. Total length of 5 segments of legs and leg formula: I 8.76=100%, II 7.08=81%, III 8.71=99%, IV 7.75=88%. Cephalothorax broad, dorsal surface very flat, brown, with sparse long and wavy, up-



Figs 16–21. Comparison of genital organs and general appearance of related genus *Modunda*: *M. staintoni* (O. Pickard-Cambridge, 1872): 16–17, 21 — female of *M. pbragmitis* Simon, 1901, lectotype from Suez, coll. MNHN — Paris; 19–21 — male of “*Icius angustatus*” from O. Pickard-Cambridge collection, HEC. Copyright by J. Prószyński.

Рис. 16–21. Сравнение копулятивных органов и внешнего вида родственного рода *Modunda* [*M. staintoni* (O. Pickard-Cambridge, 1872)]: 16–17, 21 — самка *M. pbragmitis* Simon, 1901, лектотип из Суэца, коллекция MNHN, Париж; 19–21 — самец “*Icius angustatus*” из коллекции O. Pickard-Cambridge, HEC.

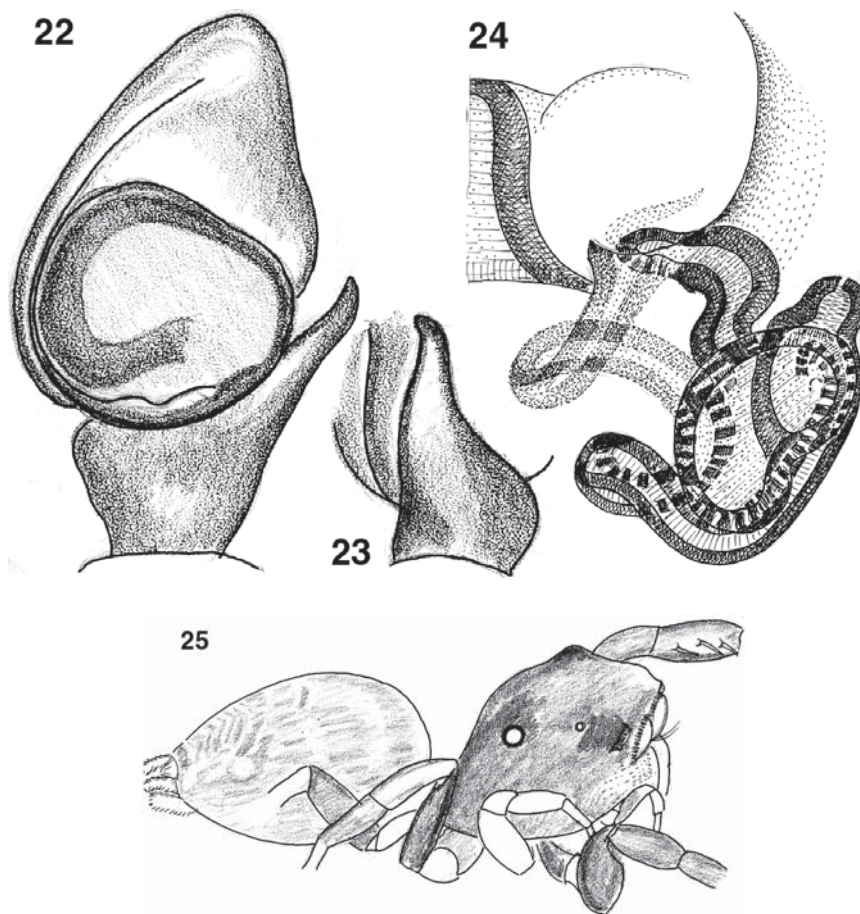
right brown setae, between them small adpressed whitish setae. Posterior slope with darker triangle spot, separating into streaks diverging back from the fovea area; ventral edge sclerotized black, with indistinct line of whitish adpressed short setae immediately above. Abdomen dark brown mottled lighter brown to yellow, with pairs of marginal whitish spots and indistinct pattern of diagonal dorsal lines, consisting of small dots (see Fig. 32), covered with mixed dark and white upright setae, giving a “hairy” appearance, there are also adpressed minute whitish setae, light reflecting. Frontal view: face low with clypeus much reduced, eyes I in single row, diameter of ALE $3/5^{\text{th}}$ of AME. Color of face brown, with brownish setae around eyes I and long brown bristles on clypeus, stretching forward but slightly bent apically, part of them also overhanging cheliceral bases; there are two bent thin brown bristles between AME, resembling slightly “horns” in *Thoreliola*. Chelicerae brown, basally covered with dense

fur of white setae, of which a part is adpressed and short, another part longer, stretching diagonally almost along the whole length of chelicerae. Pedipalps lighter brown, prolaterally yellow. Legs I dark brown, longer and more robust, particularly femur I. Remaining legs lighter brown, legs III almost equal in length with legs I. Ventral aspect: mouth parts chestnut brown, sternum and coxae brownish yellow, abdomen ventrally with anterior part light grey, the area behind epigastric fold dark brownish grey, delimited marginally by a pair of whitish yellow streaks.

Havaika cruciata Simon, 1900), **comb.n.**
Figs 34–36.

Sandalodes cruciatus Simon, 1900: 516, T.18 F.11.

Syntypes: 1 ♂, 1 ♀ (MNHN), “21077 *Sandl. cruciatus* E.S. Hawaii (Perkins”; 1 ♂ (BM), Hawaii, Kana, VI. 1893. Perkins “1904. X. 24: 440–442”.



Figs 22–25. Comparison of genital organs and general appearance of *Bianor albobimaculatus* from Israel: 22–23 — male palp and its tibial apophysis; 24 — internal structure of epigynum — right spermatheca with channels, 25 — general appearance of female (note high and short cephalothorax). Copyright by J. Prószyński.

Рис. 22–25. Сравнение копулятивных органов и внешнего вида *Bianor albobimaculatus* из Израиля: 22–23 — пальпус и тибиа́льный отросток самца; 24 — внутреннее строение эпигины (правая сперматека с каналами), 25 — общий вид самки (отметьте высокий и короткий карапакс).

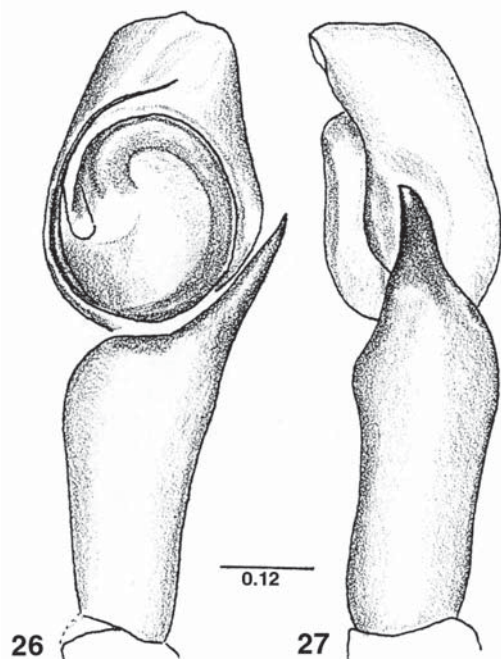
REMARKS. Specimens small. Cymbium appear somewhat longer than tibia; embolus arises in the mid-length of bulbus and bends diagonally around $\frac{3}{4}$ of anterior edge of bulbus. Abdominal pattern seems be particularly useful for diagnostic purposes: in male brown with median white streak consisting of fused, modified chevrons; in female transverse lines (fragments on whitish background).

Havaika flavipes (Berland, 1933), **comb.n.**

Sandalodes flavipes Berland 1933: 58, f. 34, 35.

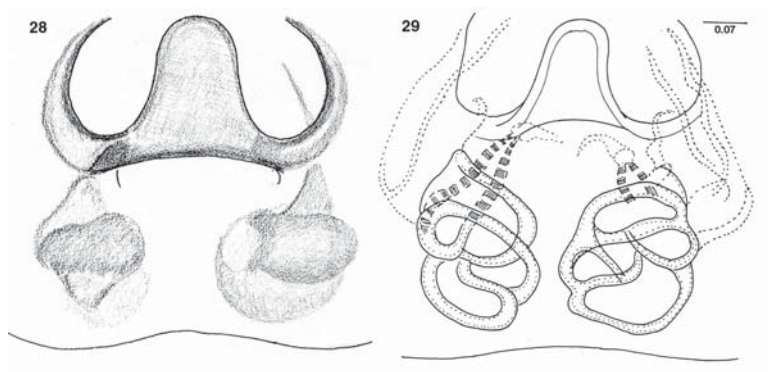
Holotype 636 1 ♀ (BMHH) “*Sandalodes flavipes* Berland, 1933 “, “ Mt. Temetiu, Hiva Oa, Marquesas Is. 3750 ft. 27. XII. 1930”, “H. Tauraa collector”, “Pacific Entomological Survey”.

DIAGNOSIS. Female. Small resembling other *Havaika*, abdominal pattern consists of diagonal brown and whitish bands.



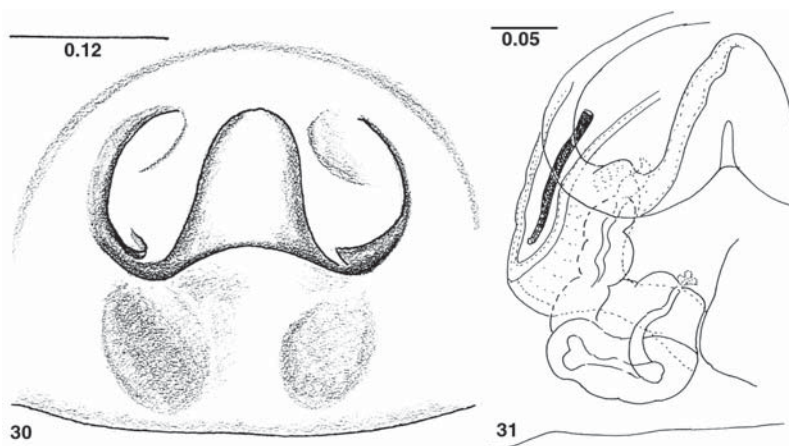
Figs 26–27. *Havaika albociliata* Simon, 1900): palpal organ of type specimen, ventral (26) and lateral (27) views. Copyright by J. Prószyński.

Рис. 26–27. *Havaika albociliata* (Simon, 1900), пальпус типового экземпляра, вентрально (26) и латерально (27).



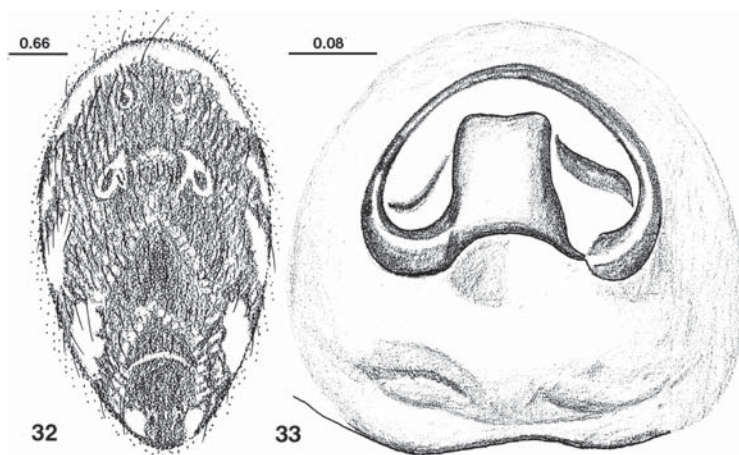
Figs 28–29. *Havaika albociliata* Simon, 1900), female specimen found in the same vial with type: epigynum (28) and its internal structure (29). Copyright by J. Prószyński.

Рис. 28–29. *Havaika albociliata* (Simon, 1900), самка, обнаруженная в пробирке с типом: эпигина (28) и ее внутреннее строение (29).



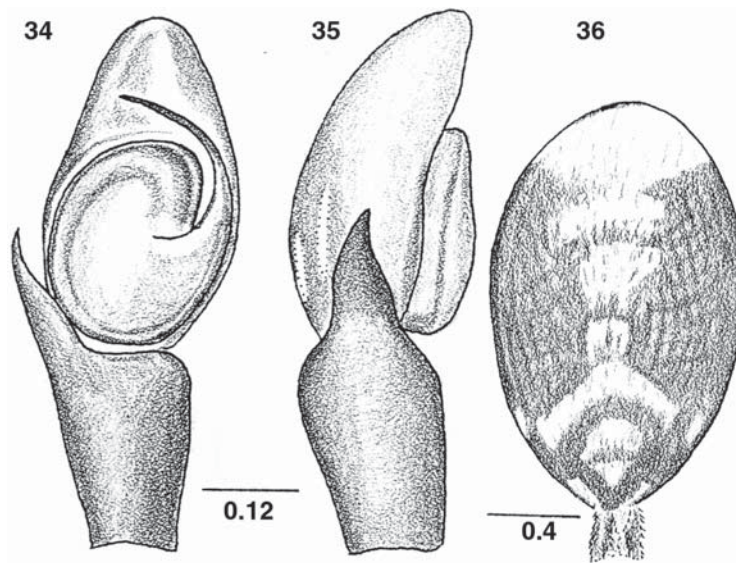
Figs 30–31. Epigynum (30) and internal structure (31) of female identified by Krauss as *Havaika albociliata*, found in the same area as type but presumably not conspecific (note differences in spermatheca). Copyright by J. Prószyński.

Рис. 30–31. Самка, определенная Краусс как *Havaika albociliata* и обнаруженная в пробирке с типом, но вероятно не конспецифична ему (заметьте отличия в сперматеке): 30 — эпигина, 31 — внутреннее строение эпигины.



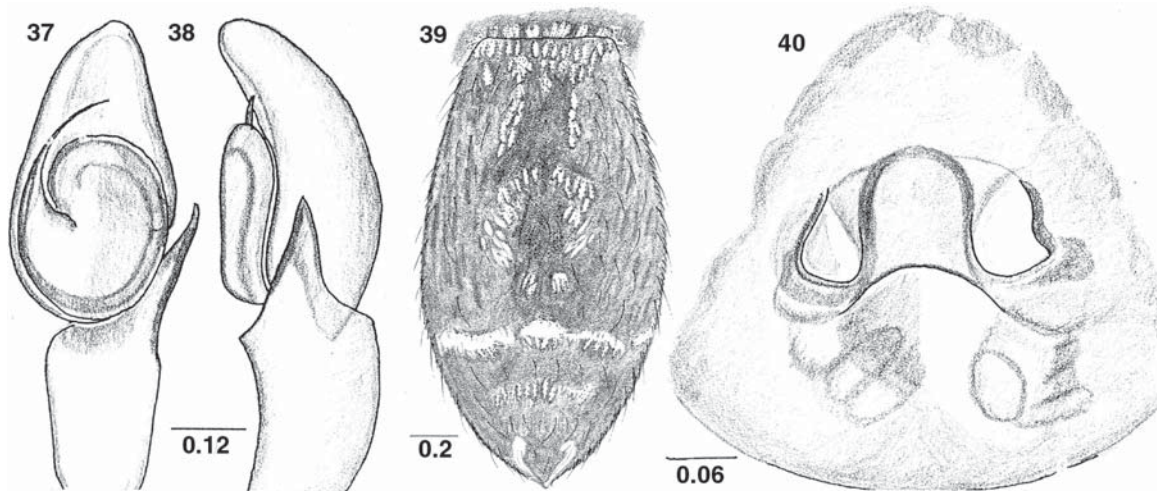
Figs 32–33. *Havaika canosa* (Simon, 1900), type specimen: 32 — abdominal pattern, 33 — and epigynum. Copyright by J. Prószyński.

Рис. 32–33. *Havaika canosa* (Simon, 1900), тип: 32 — окраска брюшка, 33 — эпигина.



Figs 34–36. *Havaika cruciata* (Simon, 1900): 34–35 — male palpal organ ventrally (34) and laterally (35); 36 — abdomen dorsally. Copyright by J. Prószyński.

Рис. 34–36. *Havaika cruciata* (Simon, 1900): 34–35 — палец самца, вентрально (34) и латерально (35); 36 — брюшко, дорзально.



Figs 37–40. *Havaika navata* (Simon, 1900): 37–39 — male (syntype from British Museum) palpal organ ventrally (37), and laterally (38), abdominal pattern (39); 40 — female (syntype from MNHN), epigynum. Copyright by J. Prószyński.

Рис. 37–40. *Havaika navata* (Simon, 1900): 37–39 — самец (синтип из Британского Музея), палец вентрально (37) и латерально (38), окраска брюшка (39); 40 — самка (синтип из MNHN), эпигина.

Havaika navata (Simon, 1900), **comb.n.**
Figs 37–40.

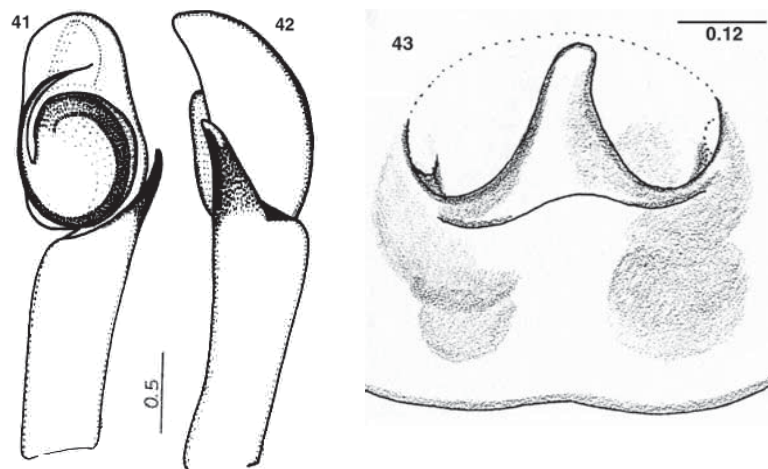
Sandalodes navatus Simon, 1900: 515 T. 18 F. 9

Presumably syntypes: 1 ♂ 1 ♀ (MNHN), “14229 *Sandal. navatus* E.S. Hawaii (Perkins”; 1 ♂, 1 imm (BM), “*Sandalodes navatus* E.S. Hawaii: Koele”, “Koele”, 1904. X. 24. 432–434”. Non-type 1 ♂ (BM) of different species in the same vial, separated by a cotton stopper labeled “*Sandalodes navatus* E.S. Kanai”, “Waniheia”? illegible label] “1904/24 7d”.

REMARKS. Measurements of male *H. navata*: LC 2.34 mm, LE 44 %, HC 50 %, WE1 61 %, WE3 64 %, WC3 75 %, MWC 75%, LDC 72 %, LA 100%, MWA 55 %. Length of 5 segments of legs I 5.59=100%, II 3.82=68%, III 4.51=81%, IV 4.55=81%.

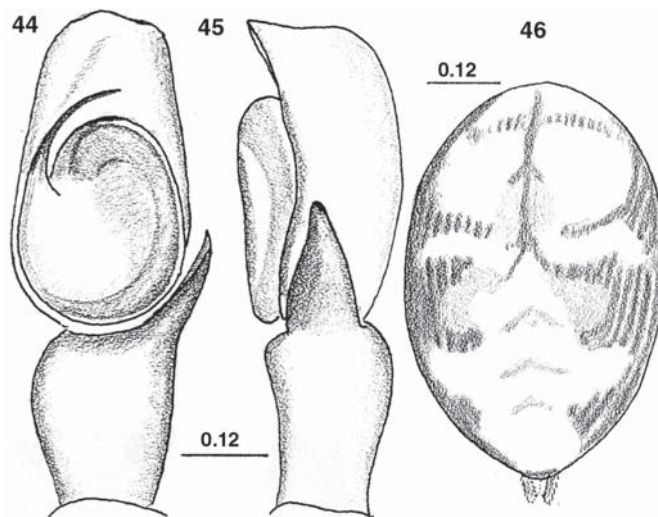
Syntype male from “Koele” has abdomen smaller than other specimens, slightly shrunken but with well preserved coloration. Its orbital setae around AME and ALE appear indistinctly orange-yellowish, almost colorless; there are three thin rows of sparse white setae along each chelicera.

Specimen from “Kanai” presumably belongs to different species, by general appearance resembling rather *Havaika validus*. It has larger abdomen with poorly preserved coloration.



Figs 41–43. *Havaika pubens* (Simon, 1900): 41–42 — male palpal organ ventrally (41), and laterally (42); 43 — female epigynum (43). Copyright by J. Prószyński.

Рис. 41–43. *Havaika pubens* (Simon, 1900): 41–42 — палец самца вентрально (41) и латерально (42); 43 — эпигина.



Figs 44–46. *Havaika senicula* (Simon, 1900): 44–45 — palpal organ ventrally (44) and laterally (45); 46 — abdominal pattern. Copyright by J. Prószyński.

Рис. 44–46. *Havaika senicula* (Simon, 1900): 44–45 — палец самца вентрально (44) и латерально (45); 46 — окраска брюшка.

tion, slightly macerated; dorsal orbital setae over AME are strikingly white, ventral colorless, slightly yellowish. There is a triangle of white scales on the eye field, touching AME dorsally. There are three thin rows of sparse white setae along each chelicera.

Havaika nigrolineata (Berland, 1933), **comb.n.**

Sandalodes nigrolineatus Berland 1933: 58, f. 31–33.

Holotype ♀ (BMHH) “*Sandalodes nigrolineatus* Berland, Holotype 635” “Nuku Hiva: Onuma”.

REMARK. Female — small specimen, partially discolored, abdomen dorsally light, surrounded light, with a thin, median brown line.

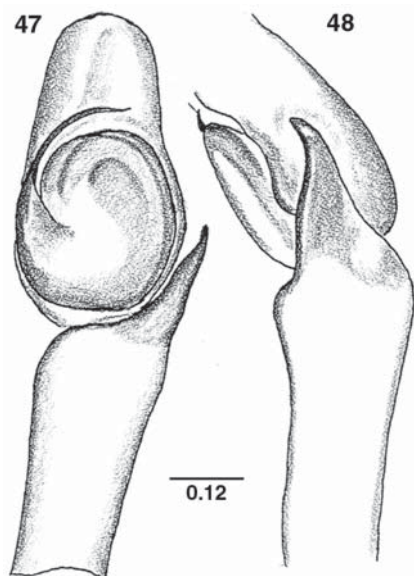
Havaika pubens (Simon, 1900), **comb.n.**
Figs 41–43.

Sandalodes pubens Simon, 1900: 513, T.18 F.7.

Sandalodes pubescens: Prószyński 1984: 66. [NB. Spelling “pubescens” from the original label, “pubens” is apparently a misspelling, which become a valid name because was printed in the original description]

Syntypes. ♂ (MNHN), “20947. *Sand.l.des pubescens* ES. Hawaii: Kenu (Perkins); 1 ♀, 1 imm (MNHN), “*Sandalodes pubens* E. S. Hawaii, Kau, 1895. “1904. X. 24: 412–413”

REMARK. Chelicerae covered in basal half by dense white scales. Abdomen dark with colorless — light reflecting scales medially, the anterior margin is white — that white line is extended by two pairs of marginal diagonal spots.



Figs 47–48. *Havaika validus* (Simon, 1900): male palpal organ ventrally (47), laterally (48). Copyright by J. Prószyński.

Рис. 47–48. *Havaika validus* (Simon, 1900): пале́пус самца вентра́льно (47) и лате́рально (48).

Havaika senicula (Simon, 1900), **comb.n.**

Figs 44–46.

Sandalodes seniculus Simon, 1900: 517, Table 18, Figs 12.

Syntype. ♂ (BM), "*Sandalodes seniculus* Simon, [Hawaii] Haleakala "1904. X. 24: 443".

REMARK. Clypeus now light brown with whitish and colorless scales, a few over ventral edge, best visible in triangles between eyes median — dorsally and ventrally. A few scales-setae above eyes median — yellowish. White setae horizontally along lateral surfaces anteriorly. Whitish scales on face, are mainly colorless and much less visible. *H. senicula* has no visible lines of white setae along chelicerae (which are changed to greyish yellow now). Small specimen.

Havaika triangulifera (Berland, 1933), **comb.n.**

Sandalodes triangulifer Berland 1933: 56, f. 29.

Holotype. ♀ (BMHH), "*Sandalodes triangulifer* Berland HOLOTYPE 624", Amatea, Tahuata, Marquesas Is, 2500 ft. 27. VI. 1930 "Le Bronnec & H. Tauraa collectors". A note put into tube: "This is the type according to collecting data and sex, given in original publication. The other vial is the "type du male", therefore a paratype".

1 ♂, 2 imm. (BMHH), "*Sandalodes triangulifer* Berland TYPE du M Berland", "Fatu Hiva, Marquesas Is". "Le Bronnec collector". A note put into tube: "This is a paratype male and 2 juveniles. Collecting data do not match these given in original description, however". Not conspecific with female holotype.

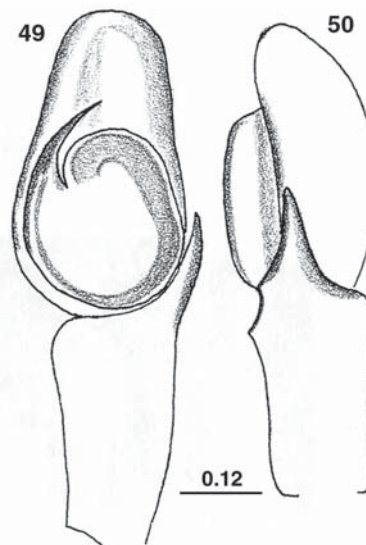
REMARK. Female 1 cm long, robust, abdomen brown with a beautiful median chain of small white triangles, epigyne like other *Havaika*.

Male from Fatu Hiva has a nice abdominal pattern: light brown, mottled, surrounded by whitish margins; darker frame provided by brown sides — an unique character.

Havaika valida (Simon, 1900), **comb.n.**

Figs 47–48.

Sandalodes validus Simon, 1900: 516, T.18 F.10.



Figs 49–50. *Havaika verecunda* (Simon, 1900): male palpal organ ventrally (49) and laterally (50). Copyright by J. Prószyński.

Рис. 49–50. *Havaika verecunda* (Simon, 1900): пале́пус самца вентра́льно (49) и лате́рально (50).

Syntypes. 1 ♂ (BM), "*Sandalodes validus* Simon, 1900. Olau", "1904 X. 24: 422"; 2 ♂♂ (MNHN), "22201 *Sandalodes validus* E.S. Oahu (Perkins)" — presumably conspecific with specimen from British Museum, one ♂ half smaller than other.

REMARK. Length of body about 1 cm, palpus resembles *Havaika pubens*: Prószyński, 1984: 66; cephalothorax broad, rather flat, eyes I in single row, clypeus reduced, chelicerae elongated, stretching horizontally, abdomen elongate oval, legs I long.

Havaika verecunda (Simon, 1900), **comb.n.**

Figs 49–50.

Sandalodes verecundus Simon, 1900: 516, T.18 F.10.

Syntypes. 1 ♂, 2 imm (BM), "*Sandalodes verecundus* E.S. Oahu." "Kavaioloa River, Oahu. April 1893" "1904 4. X. 24. 437-439"; 2 imm (MNHN), "18538 *Sandl. verecundus* E.S. Lanai (Perkins)", "18. 538" — immature, discolored, unusable.

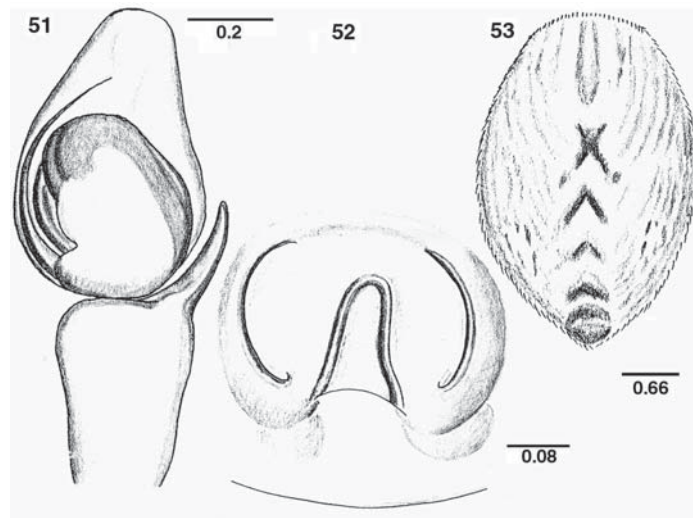
REMARK. Syntype of *H. verecunda* has eyes I surrounded by distinct white setae, triangle of white scales dorsally between eyes AME, clypeus without white setae/scales, lines of white setae along chelicerae, remnants of abdominal pattern. Resembling *H. valida* by palp. Much smaller, only traces of pattern on abdomen preserved.

Short review of other genera of *Salticidae* found in Hawaii

A. Genera related to *Havaika*

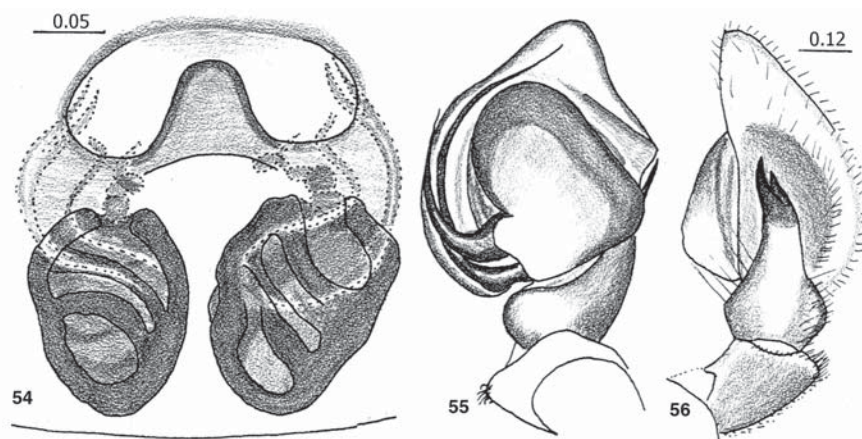
Habronattus F.O. Pickard-Cambridge, 1901

Large N American genus containing in N America 94 species, extensively studied by Griswold [1987]. One species — *H. tarsalis* (Banks, 1904) was found also in Hawaii. Female's epigyne resembles *Havaika* by general plan, its internal structure is known from a few species only, seems to



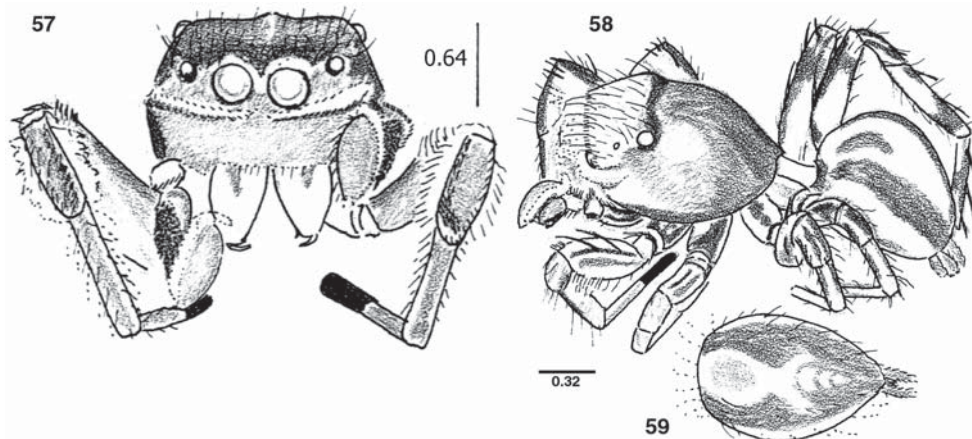
Figs 51–53. *Habronattus rufescens* (Berland, 1934), syntypes: 51 — palpal organ, 52 — epigynum, 53 — abdominal pattern in female. Copyright by J. Prószyński.

Рис. 51–53. *Habronattus rufescens* (Berland, 1934), синтипы: 51 — палепус, 52 — эпигина, 53 — окраска брюшка самки.



Figs 54–56. *Habronattus tarsalis* (Banks, 1904): 54 — internal structure of epigynum; 55–56 — palpal organ. Copyright by J. Prószyński.

Рис. 54–56. *Habronattus tarsalis* (Banks, 1904): 54 — внутреннее строение эпигины; 55–56 — палепус.



Figs 57–59. *Habronattus tarsalis* (Banks, 1904): 57–58 — external appearance of male: frontal view (57), general appearance laterally (58); 59 — abdomen dorsally. Copyright by J. Prószyński.

Рис. 57–59. *Habronattus tarsalis* (Banks, 1904): 57–58 — внешний вид самца, фронтально (57) и латерально (58); 59 — брюшко дорзально.

differ by more compact structure of spermathecae, to which opens directly soft copulatory (entrance) channel.

Habronattus rufescens (Berland, 1934) **comb.n.**

Figs 51–53.

Sandalodes rufescens Berland, 1934: 334, f. 14–17 (D MF).

SYNTYPES. ♂♀ (BM), “*Sandalodes rufescens* Marquesas, Hiva Oa, 3000–4000 ft, 31. XII. 24. C.L. Bollenette. 1926. 1. 27. 297–304”.

REMARK. Male has rudiments of abdominal pattern comparable with that in female. Species differs from *H. triangulifera* by being more robust, by different abdominal pattern and different genital organs.

MEASUREMENTS. (First figure ♂, second ♀): LC 3.84–3.36 mm, LE 47–48 %, HC 49–53 %, WE1 62–71 %, WE3 62–71 %, WC3 97–93 % MWC 97–93 %, LA 119–121 %, MWA 87–86 %. Length of legs. Male: I 13.32=100%, II 8.04=60%, III 8.52=64%, IV 8.76=66%. Female: I 7.20=100%, II 6.19=86%, III 7.32=102%, IV 8.40=117%.

Habronattus tarsalis (Banks, 1904)

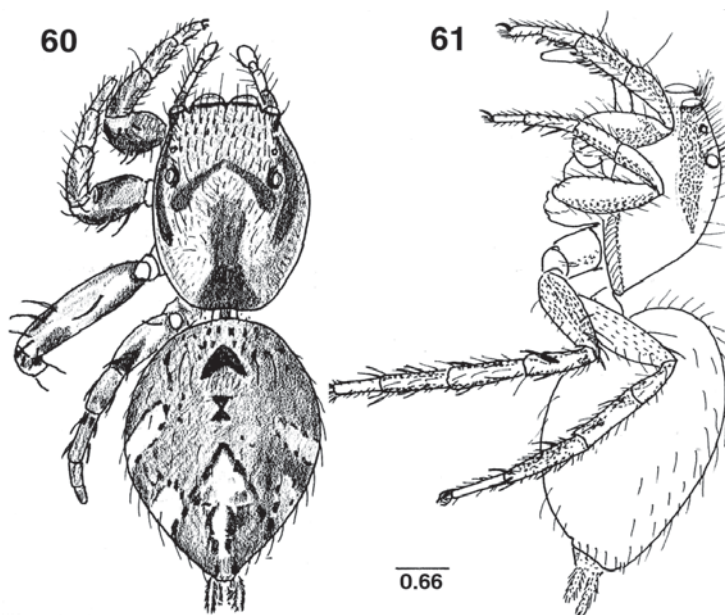
Figs 54–56, 57–59, 60–63.

MATERIAL. 1 ♂ (JWB) — *Habronattus tarsalis* Hawaii, Ka'u District, on road near Green Sand Beach, 5 Feb. 1997. Coll. J.W. & E.R. Berry, det. J.A. Beatty; 1 ♀ (JWB) — *Habronattus tarsalis* — Hawaii, Kauai Co., Kalalau Lookout, Elev. 4000 ft. Koa forest. 19 Feb. 1993. Coll. D. Jamieson. 1 ♀ (JWB) *Habronattus* sp. Hawaiian: Hale Pohaku, on Mauna Kea, 8000 ft.. 20. VI. 1966. T. Suman. 1 ♀ (JWB) *Habronattus* sp. [Hawaii] Saddle area, 6000 ft.. 29. VI. 1966. T. Suman. 1 ♂, 1 ♀, 1 imm. (JWB) *Habronattus tarsalis* ? Hawaiian Is: Oahu, Honolulu. 25. X. 1949. L.M. Chilson. Wall. 1 ♂, 1 ♀, 1 imm. (JWB) *Habronattus tarsalis* ? Hawaiian Is: Lanai I. 2–9. II. 1985. V. & B. Roth, det. J. Prószyński, 1998.

REMARKS. Recent import to Hawaii from North America. Male has body covered with dense whitish setae, on abdomen scale like. Clypeus high and broad, covered with characteristic light scale-like setae; separated from eyes I by a white line of dense and upright, short setae (Fig. 57). Abdomen with median darker marks, posteriorly white marks, and with elegant white arrow along posterior 1/3 of abdomen, when devoid of setae tegument dark brown. Adult male with striking, dense brush of black setae ventrally along the whole tarsus I, in one specimen on dorsal surface dark as well, which may signify different species; that character is not developed in immature male and in female. Conspecific status of all specimens uncertain.

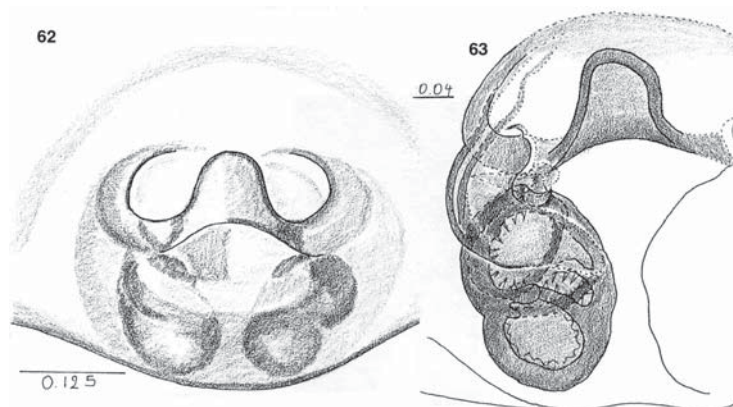
Genus *Pellenes* Simon, 1876

REMARK. Large and differentiated Palearctic genus, with a number of species occurring also in N America. Epigynum differs from both *Habronattus*, *Havaika*, *Modunda* and *Bianor* by having a pair of depressions instead of white



Figs 60–61. *Habronattus tarsalis* (Banks, 1904), external appearance of female (specimen from Waimea, 1000 m a.s.l.): dorsal (60) and lateral view (61). Copyright by J. Prószyński.

Рис. 60–61. *Habronattus tarsalis* (Banks, 1904), внешний вид самки (экземпляр из Waimea, 1000 м н.у.м.): 60 — дорзально, 61 — латерально.



Figs 62–63. *Habronattus tarsalis* (Banks, 1904) from Waimea: epigynum (62), and its internal structure (63). Copyright by J. Prószyński.

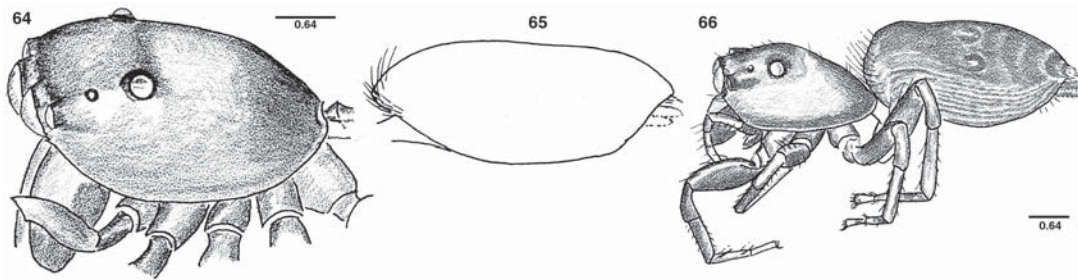
Рис. 62–63. *Habronattus tarsalis* (Banks, 1904) из Waimea: 62 — эпигина (62), 63 — внутреннее строение эпигины.

membranous “windows”; none the less seem to display similar general plan of structure. Palpal organ more developed than in *Havaika*, but with single embolus. Only one specimen was found to date on Hawaii, presumably new arrival. As N American *Pellenes* are insufficiently known, I abstain temporarily from naming and formal description of this species.

Pellenes sp.

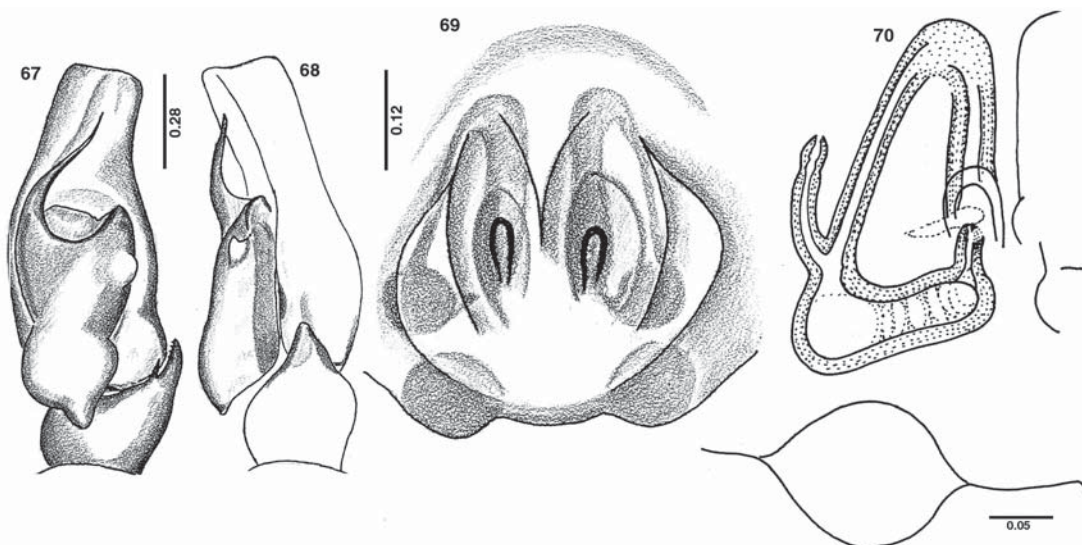
Figs 75–76.

Specimen. 1 ♀ (JWB) — *Pellenes* sp. — Hawaii Isl. RT 250 — N. of Waimea; elev. 3000 ft. 17 Feb. 1995. Coll. J.W. & E.R. Berry, det. J. Prószyński.



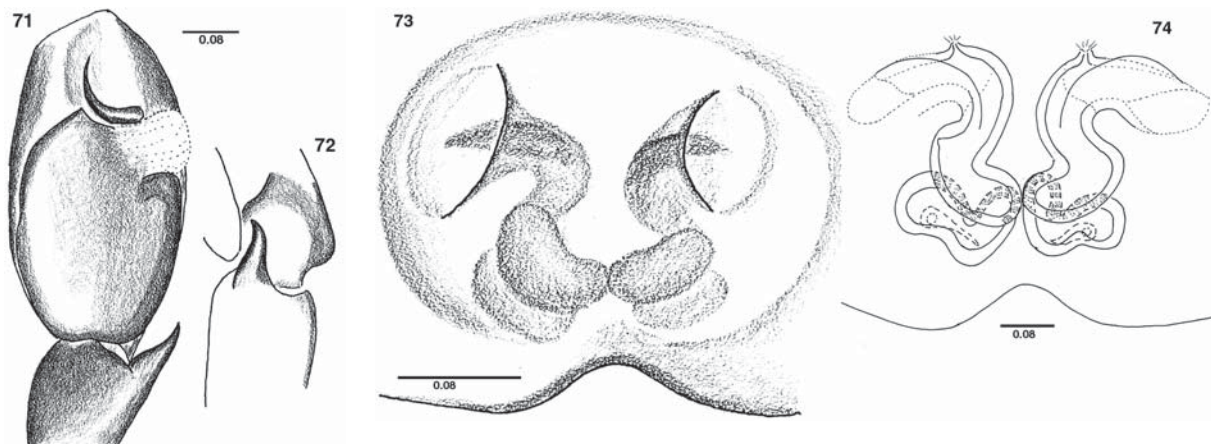
Figs 64–66. *Hakka himeshimensis* (Dönitz et Bösenberg in Bösenberg, Strand, 1906): 64 — general appearance of male, 65 — male's abdomen, 66 — female. Copyright by J. Prószyński.

Рис. 64–66. *Hakka himeshimensis* (Dönitz et Bösenberg in Bösenberg & Strand, 1906): 64 — внешний вид самца, 65 — брюшко самца, 66 — самка.



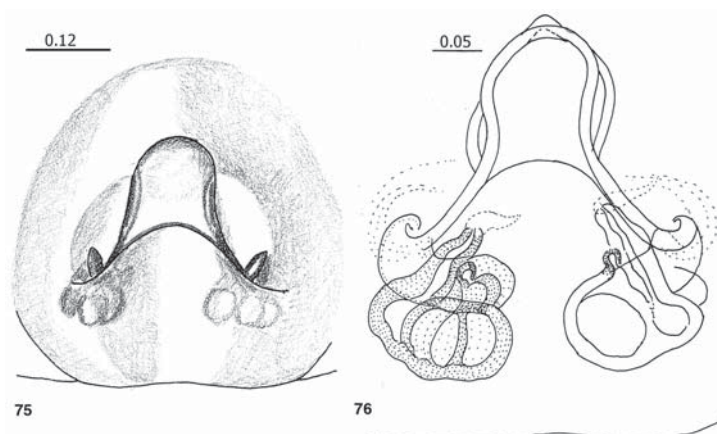
Figs 67–70. *Hakka himeshimensis* (Dönitz et Bösenberg in Bösenberg, Strand, 1906): 67–68 — palpal organ; 69–70 — epigynum (69) and its internal structure (70). Copyright by J. Prószyński.

Рис. 67–70. *Hakka himeshimensis* (Dönitz et Bösenberg in Bösenberg & Strand, 1906): 67–68 — пальпус; 69–70 — эпигина (69) и ее внутреннее строение (70).



Figs 71–74. *Messua* sp. cf. *felix*: 71 — palpal organ ventrally; 72 — tibial apophysis laterally; 73–74 — epigynum (73), and its internal structure (74). Copyright by J. Prószyński.

Рис. 71–74. *Messua* sp. (cf. *felix*): 71 — пальпус самца, вентрально; 72 — тибийный отросток, латерально; 73–74 — эпигина (73) и ее внутреннее строение (74).



Figs 75–76. *Pellenes* sp.: 75–76 — epigynum (75), and its internal structure (76). Copyright by J. Prószyński.
Рис. 75–76. *Pellenes* sp.: 75–76 — эпигина (75) и ее внутреннее строение (76).

REMARK. Genus closely related to *Habronattus*, with numerous species in Palaearctics, and a few in N America. Externally differs by having clypeus narrow, with narrow fringe of white hairs hanging diagonally down from clypeus edge. Chelicerae light brown, basally with a few white hairs. Thoracal light streak elongate rectangular, broader than in other species. Abdomen elongate, covered with numerous white scales, and with median pattern of dark dots, arranged in reversed “Y”; damaged now, with tegument separated from soft tissues. Epigynum resembles somewhat *Pellenes levi* Lowrie et Gertsch, 1955, with two lateral depressions, vaginal roof broad and long, with spermathecae located at ends of its drawn angles. With insufficient knowledge of N American species I abstain from specific identification.

B. Genera not related to *Havaika*

Genus *Hakka* Berry and Prószyński, 2001

Hakka himeshimensis (Doenitz et Strand in Boesenberg, Strand, 1906)

Figs 64–70.

Menemerus himeshimensis Dönitz, Strand in Bösenberg, Strand, 1906: 395–396, table 8, fig. 116; table 14, fig 309;

Menemerus himeshimensis: Yaginuma, 1970: 67; 1986a: 234, fig. 130.2;

Icius himeshimensis: Prószyński, 1976: map 105;

Salticus koreanus Wesołowska, 1981: 78, figs 102–105;

Icius himeshimensis: Bohdanowicz, Prószyński, 1987: 66–67, figs 65–66;

Pseudicius himeshimensis: Prószyński, 1987: 151 (transfer from *Menemerus*, *Icius*);

Icius himeshimensis: Chikuni, 1989: 151, fig. 22;

Pseudicius himeshimensis: Peng, Xie, Xiao, 1993: 191–192, figs 667–670;

Hakka himeshimensis: Berry and Prószyński, 2001: 202–204, Figs 1–7.

Material studied. 1 ♂ (AMNH) *Hakka himeshimensis* [Hawaii] Necker Isl. 14.VI.1923. E.M. Bryan Jr. under stones. Coll AMNH; 1 ♀ (JWB) *Hakka himeshimensis* Hawaii, near Nailoa, Anagho'omalu Bay, among beach rocks, 17 Feb. 1988; and 1 ♀ (JWB) — same place, on black lava beach. 15 Feb. 1997. J. & E. Berry. All specimens identified by J. Prószyński.

Discovery of 3 specimens of this species (known previously from China, Japan and North Korea) in Hawaii, collect-

ed in space of 74 years, permitted to confirm its arrival to the islands, although no permanent population was discovered.

Examination of these specimens at the time when character of *Icius*, *Menemerus* and *Pseudicius* are well understood, permitted to decide that it cannot be classified into any of these genera and deserves delimitation to the genus of its own — which we decided to call *Hakka*. At the moment the genus is monotypic, but as with other genera in Palaearctic Far East, with progress of faunal research one may expected discovery of more species. The species is defined well enough by its unique palpal organ (Figs 67–68) and epigynum (Figs 69–70). Generic characters are well visible on drawings of general appearance (Figs 64–66), special importance have absence of stridulatory row of setae beneath eyes lateral, shape of body and shape and proportions of legs in female (male specimen lost legs).

Genus *Messua* Peckham et Peckham, 1896

Messua cf. *felix*

Figs 71–74.

MATERIAL. 3 ♂♂, 2 ♀♀ (AMNH), *Messua* sp. Hawaii, Honolulu, Apr. 5. 1950. D.E. Hardy, det. J. A. Beatty.

Texan species of a Cenral American genus, never reported from Hawaii. Males with enormously elongated, diverting chelicerae with single long retrolateral tooth.

Genus *Phidippus* Simon, 1876

Phidippus audax (Hentz, 1845)

Figs 77–78.

MATERIAL. 1 ♀ (AMNH), Hawaii: Poamoho, Oahu, Mar. 8, 1950. Y. Tanada, det. G.B. Edwards.

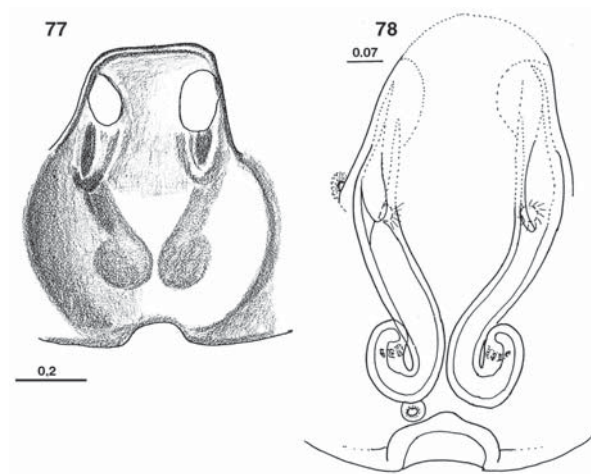
Large specimen. New for Hawaii.

Genus *Ptocasius* Simon, 1885

Ptocasius sp. n. [?]

Figs 79–80.

MATERIAL. 1 ♂ (BMHH), Hawaii, Oahu, Mt. Tantalus, 1800 ft. ex leaf mould. 22. Oct. 1966. J.R. Vockeroth.



Figs 77–78. *Phidippus audax* (Hentz, 1845): epigynum (77), and its internal structure (78). Copyright by J. Prószyński.

Рис. 77–78. *Phidippus audax* (Hentz, 1845): эпигина (77) и ее внутреннее строение (78).

New for Hawaii.

REMARK. Identification tentative, based on expanded ventral groove in the cymbium, distinctly broader than bulbus, bulbus oval without protuberance, embolus arises at 8 o'clock, distinctly longer than bulbus and running at a space from it, but not twisted around. Tibial apophysis narrow, slightly bent, reaching half of bulbus, when seen laterally — has slightly wavy end.

DESCRIPTION. Male. Measurements. LC 2.40=100%, LE 1.08=45%, HC 1.20=50%, W. e. f. I: 1.80=75%, W. e. f. III: 1.80=75%, W. cepth. at e. III: 1.86=77%, MWC 1.86=77%, LA 2.64=110%. Length of segments of legs: I $0.66 + 0.96 + 1.32 + 1.08 + 1.56 = 5.58$; II $0.48 + 0.78 + 0.90 + 0.78 + 1.32 = 4.26$; III $0.54 + 0.90 + 0.84 + 0.60 + 1.20 = 4.08$; Leg IV $0.60 + 1.14 + 1.08 + 0.66 + 1.39 = 4.87$. Leg formula: I 100%, IV 87%, II 76% = III 76%. Shape of cephalothorax almost square, low, flat, with eye field relatively long. Its coloration is brown, with eye field dark brown (covered sparsely with minute and adpressed, colorless seta), thorax with median yellow streak. Face dark without setae, eyes I relatively large, with sockets protruding anteriorly over bases of chelicerae, clypeus reduced to nil, without any contrasting setae. Chelicerae relatively small, fissidentate, with bicusps tooth. Abdomen completely damaged, with remnants of broken tegument only. Sternum light brown, coxae yellow. Palpal organ with cymbium cavity much broader than bulbus, apophysis long, bent. Legs and pedipalps uniformly dark yellow, which may be due to poor state of preservation. It differs from *Telamonia* by the fissidentate cheliceral tooth, and shape of cephalothorax.

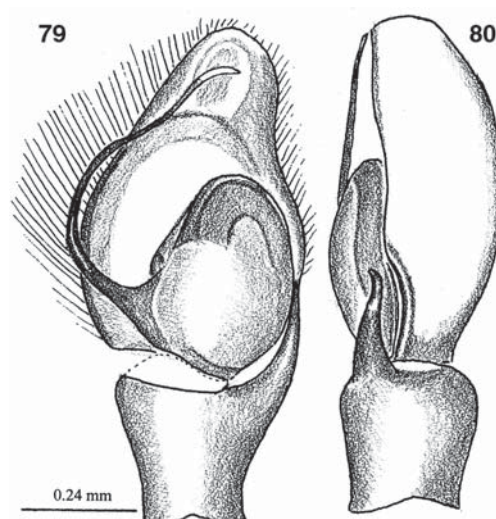
Genus *Siler* Simon, 1889

Siler sp.n.?

Fig. 81.

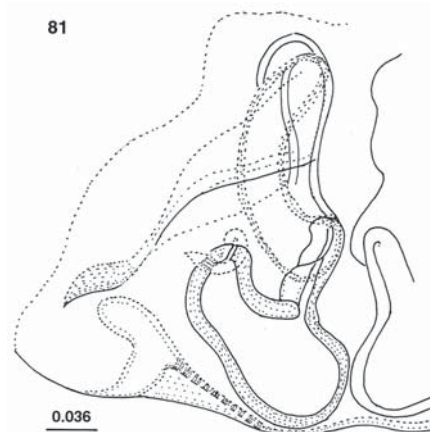
MATERIAL. 1 ♀ (BMHH), Hawaii, Oahu, Waianae Mt., Paholu Bulch, 1800, sweeping, 19 May, 1974. W.C. Gagne.

REMARKS. Female: eyes I, protruding in front of chelicerae, almost no clypeus developed, and without any contrasting setae. Chelicerae small, with fidsidentate — bicusps tooth. Legs and pedipalps of female with blackich rings.



Figs 79–80. *Ptochasius* sp., palpal organ, ventral and lateral views. Copyright by J. Prószyński.

Рис. 79–80. *Ptochasius* sp., палец самца: 79 — вентрально, 80 — латерально.



Figs 81. *Siler* sp. Internal structure of epigyne (remnants preserved on destroyed tegument of abdomen). Copyright by J. Prószyński.

Рис. 81. *Siler* sp. Внутреннее строение эпигины (остатки, которые сохранились на разрушенном тегументе брюшка).

Abdomen dark grey with 3 white round spots arranged in triangle (one in mid length of abdomen, and a pair somewhat more posteriorly).

Measurements. LC 1.74=100%, LE 0.90=52%, HC 0.96=55%, WW1 1.40=80%, WE3 1.40=80%, WC3 1.40=80%, MWC 1.40=80%, LA 2.64=153%, MWA 1.80=103%. Length of legs: I $0.42 + 0.54 + 0.72 + 0.66 + 1.02 = 3.36$; II — missing; III $0.48 + 0.60 + 0.60 + 0.48 + 0.96 = 3.12$; IV: $0.42 + 0.90 + 0.84 + 0.54 + 1.12 = 3.82$. Leg formula: IV=113%, I=100%, III=96%, II= missing.

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