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A new genus and three new species of Nogodinidae from North Africa (Insecta, Hemiptera, Auchenorrhyncha, Fulgoromorpha)

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Abstract: One new genus, *Mikewilsonia* nov.gen., and three new species, *Mikewilsonia kunzi*, *Philbyella ainsefra* and *Philbyella gnezdilovi*, are described from the Maghreb region (Morocco, Algeria).

Key words: North Africa, Maghreb, Atlas Mountains, Morocco, Algeria, Western Palaearctic, species identification, morphology, distribution, Cicadina, Fulgoroidea, new species, *Issidius*, *Rileyopsis*.

Introduction

In course of several field trips to the Maghreb region, Reinhard Remane (RR) collected several specimens of obviously undescribed taxa of the planthopper family Nogodinidae. Unfortunately, the joint project of the author with RR on the taxonomy of these species did not go beyond the very first steps, as RR passed away in 2009 (HOLZINGER et al. 2009). This paper is dedicated to the memory of Reinhard Remane. It contains descriptions of one new genus and three new species from Northwestern Africa (Maghreb region, see Fig 10), besides notes on some previously described taxa.

Nogodinidae MELICHAR, 1898 is a small planthopper family with about 100 genera and less than 400 species described (BOURGOIN 2019); mainly from subtropical and tropical realms. According to GNEZDILOV (2017a) and BOURGOIN (2019), only five genera are known from the Western Palaearctic realm, and only two are present in North Africa: *Philbyella* CHINA, 1938 and *Issidius* PUTON, 1898.

Philbyella CHINA, 1938 (typus generis: *P. arabica* CHINA, 1938) contains nine species, two of them are known from North Africa: *P. adeiba* BADAWY, EL HAMOULY & SAWABY, 2001 from Egypt and *P. brevispina* LINNAVUORI, 1989 from Hoggar Mts. in Algeria.

The second genus is *Issidius* PUTON, 1898. LETHIERRY in PUTON & LETHIERRY (1887) described *Issus rotundiceps* from Biskra, Algeria. Later, PUTON (1898) described a new genus, *Issidius* PUTON, 1898, for it and placed the genus into the family Achilidae. It was assigned to Nogodinidae only recently by ASCHE (2015).

Methods and Material

Insects were examined and measured using an Olympus SZH10 stereo microscope with an eyepiece graticule and a drawing mirror. Photographs were taken with a digital SLR

camera (Nikon D7200) attached to this microscope. Both line drawings and photographs were then edited with Adobe Photoshop (R).

Specimens are stored in following collections:

- MNHN Museum National d'Histoire Naturelle, 45 bis Rue de Buffon, Paris, France.
 OEKO Oekoteam-Institute for Animal Ecology and Landscape planning, Bergmannsgasse 22, Graz, Austria.
 HNHM Hungarian Natural History Museum Budapest, Hungary.

Results

On *Issidius* PUTON, 1898 and *Rileyopsis* BERGEVIN, 1917

According to LETHIERRY & PUTON (1887), the type specimen of *Issidius rotundiceps* is a male specimen, short-winged and 6 mm long, collected in "Biskra" by "Dr. Ch. Martin". A female is also mentioned as "variété", originating from "Batna", "D. Ch. Martin", length 5 mm. In contrast, the specimen in MNHN Paris labelled as "Type" of *Issidius rotundiceps* is a female from Biskra, with a total body length of 6.7 mm (see Fig 1). It is doubtful for me if this specimen is indeed the holotype.

Another generic name from this region is *Rileyopsis* BERGEVIN, 1917. It was described by BERGEVIN (1917) for a single species, *R. peyerimhoffi* BERGEVIN, 1917, from Djebel Haouas near El Djelfa, Algeria. Four years later, Ernest de BERGEVIN (1921) published a note on this taxon and name: In this paper, he stated, that *R. peyerimhoffi* was conspecific with *Issidius rotundiceps* (and, subsequently, considered *Rileyopsis* as a younger subjective synonym of *Issidius*). He was of the opinion, that this species occurs as small, short-winged morph in the Atlas Mts. ("*Issidius rotundiceps* var. *peyerimhoffi*") and as long-winged morph in the lowland Sahara desert. So, according to BERGEVIN (1921), *Rileyopsis* BERGEVIN, 1917 is a younger synonym of *Issidius* PUTON, 1898 and *Rileyopsis peyerimhoffi* BERGEVIN, 1917 is a younger synonym of *Issidius rotundiceps* LETHIERRY in PUTON & LETHIERRY, 1887. But, at the time Bergevin published this synonymy, he was neither aware of the importance of (inner male and female) genitalia structures for species identification nor of the enormous species diversity revealed only by studying these structures. So, in fact, the conspecificity of the types should be verified by contemporary methods.

CHINA (1938) described the genus *Philbyella*, type species *P. arabica*, but gave no characters to distinguish it from *Issidius/Rileyopsis*. Studying Nogodinidae specimens from Algeria, where *Issidius* and *Rileyopsis* occur, it seems quite probable that in fact *Philbyella arabica* is congeneric with *Issidius* and/or *Rileyopsis*. As the types were untraceable (for me), I compared *Philbyella arabica* with the descriptions of PUTON (1898) and BERGEVIN (1917). At least two diagnostic characters can be found, that might justify the presence of different genera: BERGEVIN (1917) states, that the hind tibia in *Rileyopsis* has 3-4 large lateral spines and presents a drawing with 4 spines (BERGEVIN 1917: 311, Fig 5). *Philbyella* has only 2-3 spines; the only other Nogodinidae genus in Western Palaearctic realm with 4 spines is *Iranissus* DLABOLA, 1980. A second character is the position of the CuA fork in the fore wing: According to the drawings of *Rileyopsis* in BERGEVIN (1917), the CuA vein is divided into CuA1 and CuA2 clearly distal of the

middle of the wing. In *Philbyella*, this fork is in the middle of the wing or slightly basad of the middle. In the presumptive type of *Issidius rotundiceps*, a distinct fork is not visible at all (Fig. 1). Until a solution of this problem is found (i.e. the types of *Issidius* and *Rileyopsis* are properly identified), I propose to keep the usage of *Philbyella* as previous authors did (e.g. DLABOLA 1980, LINNAVUORI 1989, GNEZDILOV 2017b).

***Philbyella ainsefra* nov.sp.**

M a t e r i a l : Holotype male: Algeria, Ain-Sefra (Oran), L. Bleuse, 6.7.1896, in coll. MNHN. Paratypes: One male, Ain-Sefra (Oran), L. Bleuse, 6.1896, in HNHM, two females (one macropterous, one brachypterous) from Ain-Sefra (Oran), L. Bleuse, 6.1896 and 6.7.1896, both in MNHN, and a brachypterous female from Ain-Sefra (collection Chobaut, collected by M. Bleuse) in HNHM; Female with left wing (except for Clavus) missing, Mékalis (Oran), L. Bleuse, 16.5.1896, in MNHN. Another macropterous male is kept in MNHN, labelled "Figuig", "coll E. Bergevin", "*Issidius rotundiceps* Leth.", "Perse Figuig (Sud-Oranais)" [Figuig is a little oasis town in southeastern Morocco, 370 km S Ouida].

B o d y s i z e : Macropterous males 8.0-8.3 mm, brachypterous males 5.6 mm; Macropterous female 8.7 mm long, brachypterous female 6.2-6.7 mm.

D e s c r i p t i o n (see also Figs 2-4): Metope about 1.5 x longer than wide, sides slightly convex, median keel present, sublateral keels missing, lateral margins elevated. Postclypeus without median keel. Head in lateral view only slightly produced, distance from compound eye to the junction of metope/vertex only 1.5 x longer than from ocellus to the lateral margin of metope.

Vertex in dorsal view apically slightly produced, forming an obtuse angle. Vertex 2.4 times as wide as medially long. Pronotum medially slightly longer than vertex. its anterior margin strongly convex. Mesonotum with three longitudinal keels. Body straw-coloured, some specimens spotted with darker brown markings.

Wing venation as in other species of the genus. Fore wings in macropterous specimens hyaline with dark markings mainly along costal border and at the tip of the wing. Cells often with dark spots in the middle (see Fig 2 and 3D).

Male anal segment basally slender in lateral view, apically broad with three large lobes: A caudal one, pointing ventrocaudad, and long lateral lobes pointing ventrad. Basis of aedeagus on each side with a bifurcate process: The inner part is flattened dorsoventrally, with a spine orientated caudally, the outer part is flattened laterally and ends in a long process strongly curved upwards (p1 in Fig 4). Aedeagus ventrally in the middle of its length with a slender, straight spine (p2 in Fig 4) on each side and longer, s-shaped spines subapically (p4 in Fig 4). Dorsolaterally, a long and slender, evenly curved spine is present on each side (p3 in Fig 4). Genital styles long, apically strongly bent dorsocephalad.

Etymology: The name is derived from the type locality of the species.

D i f f e r e n t i a l d i a g n o s i s : This species is easily distinguishable from all other *Philbyella* species by the shape of the anal tube with its three large lobes. Furthermore, the number and arrangement of lateral spines of the aedeagus and the shape of the genital styles are characteristic.

***Philbyella gnezdilovi* nov.sp.**

M a t e r i a l : Holotype male: Morocco, Atlas Mts. S Marrakesh, Pass Tizi-Ouzla 10 km SW Asni, 1000 m asl, 18.5.1981, dry bush vegetation (FASMALP 81/87), R. Remane leg., in coll. OEKO.

Paratypes: One male, Morocco, Atlas Mts. S Marrakesh, 10 km N Asni, near Tahanaoute, 900 m, 25.5.1981, dry bush vegetation (FASMALP 81/13), R. Remane leg., in coll. OEKO; one female, Morocco, Tifrit 20 km N Agadir, 28.4.1998, gorge with shrubby vegetation (MAR 98/2), R. Remane leg., in coll. OEKO.

B o d y s i z e : Males 4.1-4.2 mm, female 5.5 mm. Only brachypterous specimens known.

D e s c r i p t i o n (see also Figs 5-6, 7A, 7B): Metope less than 1.5 x longer than wide, broadest part before epistomal suture. Median keel present, sublateral keels missing, but a more or less distinct darker line present. Lateral margins of Metope slightly elevated. Postclypeus without median keel. Epistomal suture strongly curved. Junction between Metope and Vertex forming an rectangular angle in lateral view. Apical margin of vertex in dorsal view slightly convex. Vertex more than 3 times wider as medially long. Pronotum medially slightly longer than vertex. Mesonotum with three longitudinal keels.

Fore wings with fork of MP (sensu BOURGOIN et al. 2015) at 1/3 of the wing length and forks of ScP+RA with RP as well as form CuA1 and CuA2 in the middle of the wing (see Fig 5D). Colouration of body incl. wings varying from dark brown with many small, light brown dots (as holotype) to straw-coloured with only very scattered darker areas.

Male anal segment large, apically with a semicircular lobe directed downwards, shaped like a inverse "u" in caudal view.

Basis of aedeagus without processes. In the middle, two pairs of spine-like processes arise: Ventrally a smaller one, straight, pointing straight cephalad (p1 in Fig. 6), and laterally a long s-shaped one (p2 in Fig. 6). Subapically, three pairs of more or less straight spines are present (p3, p4 and p5 in Fig. 6).

The genital styles are long, evenly curved and running into a blunt tip apically.

E t y m o l o g y : This very issid-like species is named in honor of the famous Russian Issidae specialist Vladimir Gnezdilov.

D i f f e r e n t i a l d i a g n o s i s : This is the smallest Nogodinidae species in the Western Palaearctic. In male genitalia, the shape of the lateral process (p2 in Fig. 6) of the aedeagus is unique.

***Mikewilsonia* nov.gen.**

T y p u s g e n e r i s : *Mikewilsonia kunzi* nov.sp.

D e s c r i p t i o n : Metope elongate, broadening towards epistomal suture. Median keel present, sublateral keels present from the postfrontal suture to the epistomal suture. Lateral margins of Metope slightly elevated. Postclypeus and Anteclypeus with median keel, postclypeus also with lateral keels. Head in lateral view slightly produced apically. Vertex pentagonal, forming an obtuse angle apically. Lateral and apical keels elevated. Pronotum with a delicate median keel. Mesonotum with three longitudinal keels.

Fore wing with broad basal cell. Wings venation similar to *Philbyella*, with a broad costal area and postcostal cell., Common stem of ScP+RA, RP and MP very short. Fork of MP at the first third of the wing, CuA in the middle, RP shortly after CuA. Apical third of the wing with many crossveins.

Hind tibia with three lateral spines and 12 apical spines.

Male anal segment apically with larger triangular lobes on both sides, orientated ventrad. Aedeagus broad, curved upwards in lateral view. Genital styles long and broad, ending in a tooth-like process directed dorsally and a blunt tip caudad.

According to the key of GNEZDILOV (2017a), the new genus belongs to the tribe Epacriini FENNAH, 1978 of the subfamily Nogodininae.

Differential diagnosis: Similar to *Issidius*, *Philbyella* and *Hadija*, but differing from these by the presence of strong sublateral keels along the Metope (missing or only present in upper half in other genera).

Etymology: The genus is dedicated to the grandmaster of pure and applied Auchenorrhyncha research, Mike Wilson, Cardiff. Gender: Neutrum.

***Mikewilsonia kunzi* nov.sp.**

Material: Holotype male: Southern Morocco, Wadi SE Guelmim, 14.3.1971, R. Remane leg., in coll. OEKO. Paratype female: Maroc Saharien, Fom Zguid (Tata, Anti-Atlas), 28.5.1958, Ch. Rungs, in coll. MNHN.

Body size: Male 7.8 mm, female 11.1 mm. Only macropterous specimens known.

Description (see also Figs 7C-9): Metope about 1.5 x longer than wide, broadest part before epistomal suture. Median and sublateral keels present. Head in lateral view slightly produced apically, forming an acute angle. Vertex pentagonal, forming an obtuse angle apically. Vertex about 2.5 times as wide as medially long. Pronotum medially slightly longer than vertex, its anterior margin strongly convex. Mesonotum with three longitudinal keels. Ground colour of body light brown, with many darker areas and dots. Wings with larger dark margins along costal area and two brownish transverse bands in apical third.

Male anal segment basally slender in lateral view, apically with larger triangular lobes on both sides, orientated ventrad. Aedeagus broad, strongly curved upwards in lateral view. Basally two lateral lobes are present. Apically, three pairs of long and thin, zig-zag spines emanate from ventrolateral side and point towards the aedeagus apex.

Female abdomen ventrally straw coloured, only the ovipositor is dark brown throughout. Caudal border of 7th sternite in females with an obtuse-angled incision medially and two obtuse-triangular projections adjacent laterally.

Etymology: The species is dedicated to Gernot Kunz, enthusiastic Auchenorrhyncha researcher and probably the best hopper photographer in the world.

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Zusammenfassung.

Eine neue Gattung und drei neue Arten von Nogodinidae aus Nordafrika. – Eine neue Gattung, *Mikewilsonia* nov.gen., und drei neue Arten, *Mikewilsonia kunzi*, *Philbyella ainsefra* and *Philbyella gnezdilovi*, werden aus der Mahgreb-Region (Marokko, Algerien) beschrieben.

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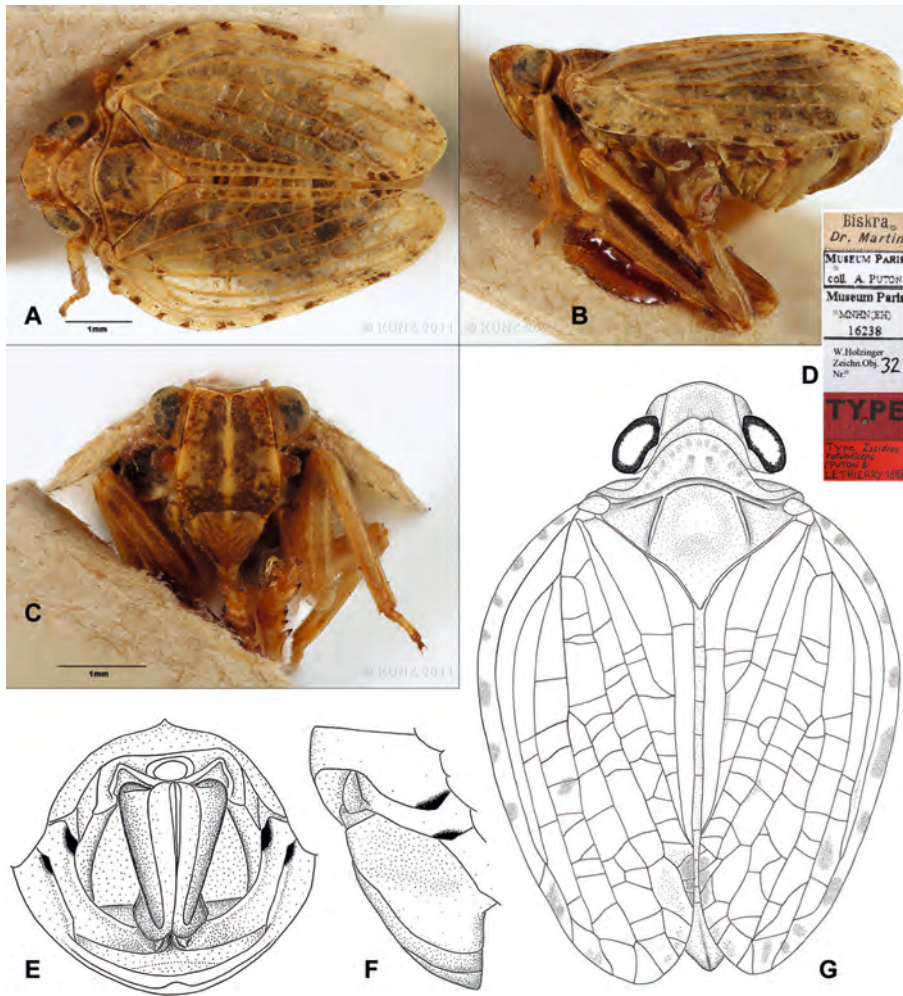


Fig 1: *Issidius rotundiceps* LETHIERRY in PUTON & LETHIERRY, 1887, female specimen from MNHN Paris, labelled as "type". A-C: habitus from dorsal (A), lateral (B) and frontal (C); D: labels of the specimen; E-F: tip of abdomen from caudal (D) and lateral (E); G: habitus sketch from dorsal. Photos Gernot Kunz, (c) MNHN Paris.

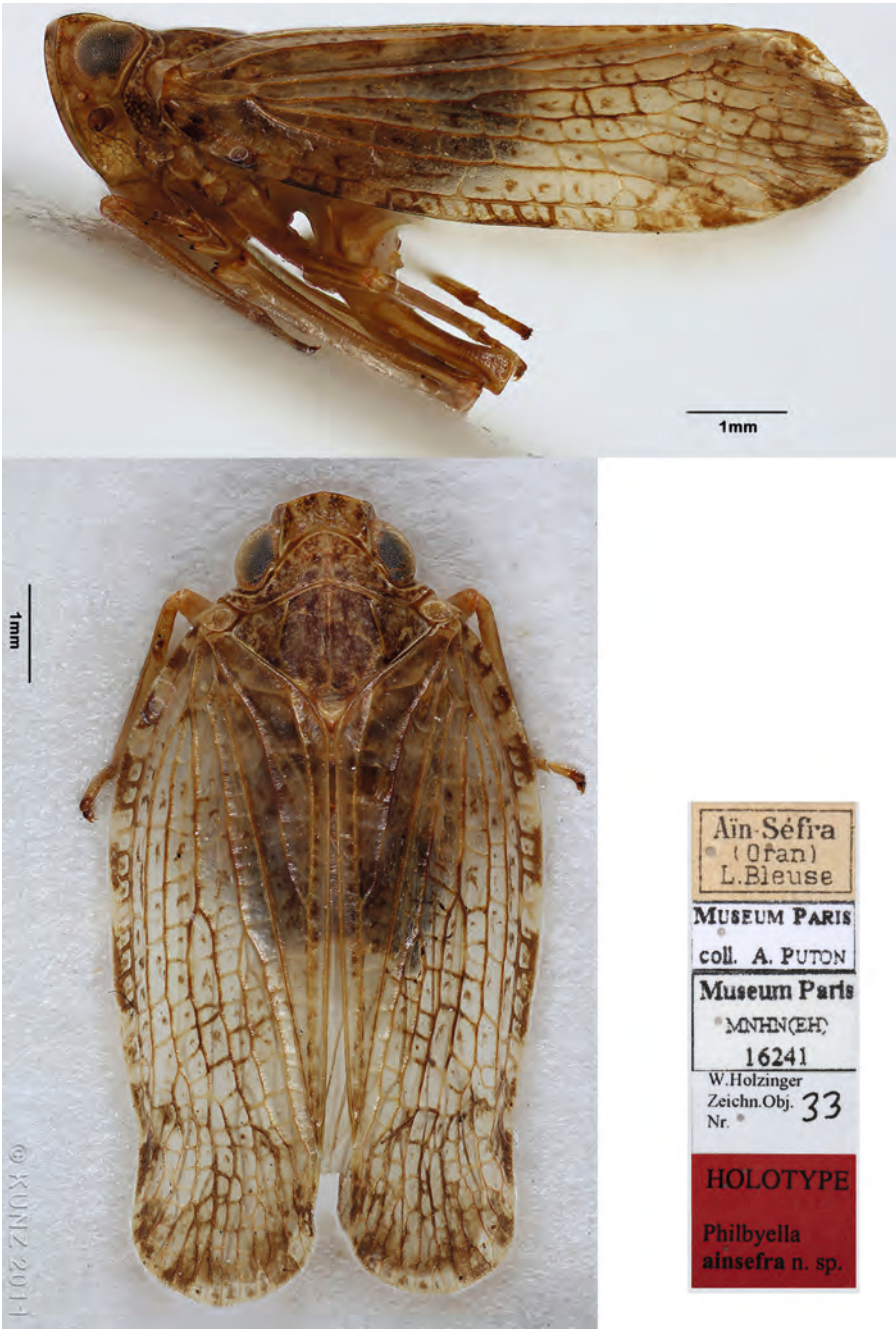


Fig 2: *Philbyella ainsefra* nov.sp., holotype in lateral and dorsal view, and labels. Photos Gernot Kunz, (c) MNHN Paris.

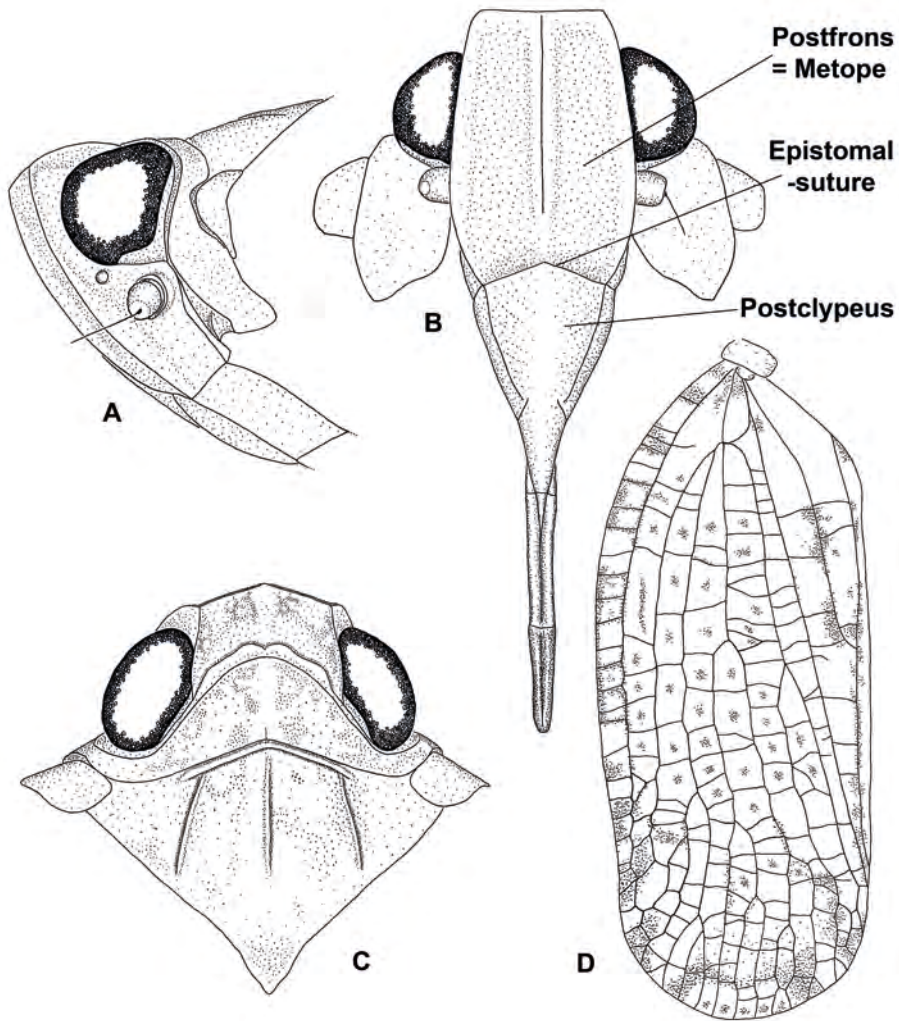


Fig 3: *Philbyella ainsefra* nov.sp., holotype: Head and fore body in lateral (A), frontal (B) and dorsal (C) view. D: left fore wing.

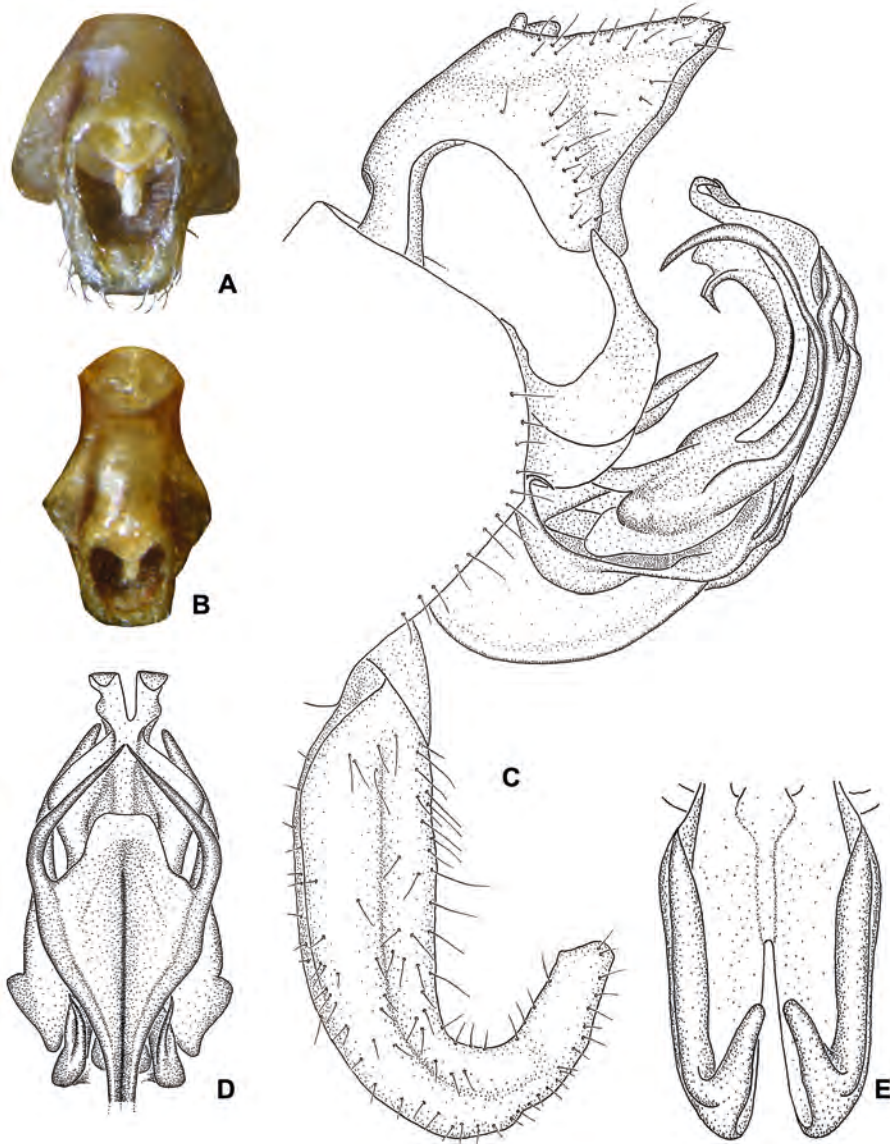


Fig 4: *Philbyella ainsefra* nov.sp., paratype: **A, B:** Anal segment in caudal (**A**) and dorsal (**B**) view; holotype: Apex of aedeagus in caudal view (**C**); Genitalia in lateral view (**D**); genital styles in inner (dorsal) view (**E**).

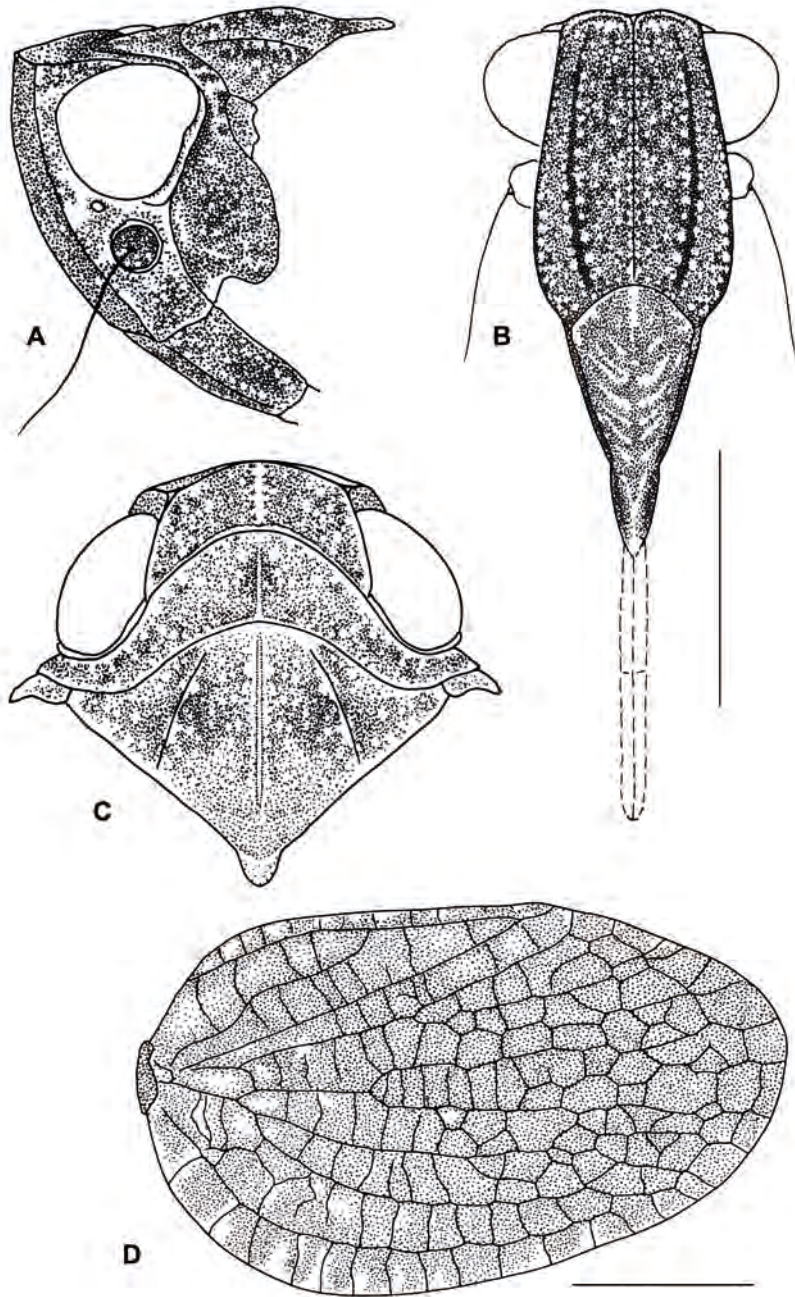


Fig 5: *Philbyella gnezdilovi* nov.sp., holotype: Head and fore body in lateral (A), frontal (B) and dorsal (C) view; left fore wing (D). Drawings by M. Stöckmann.

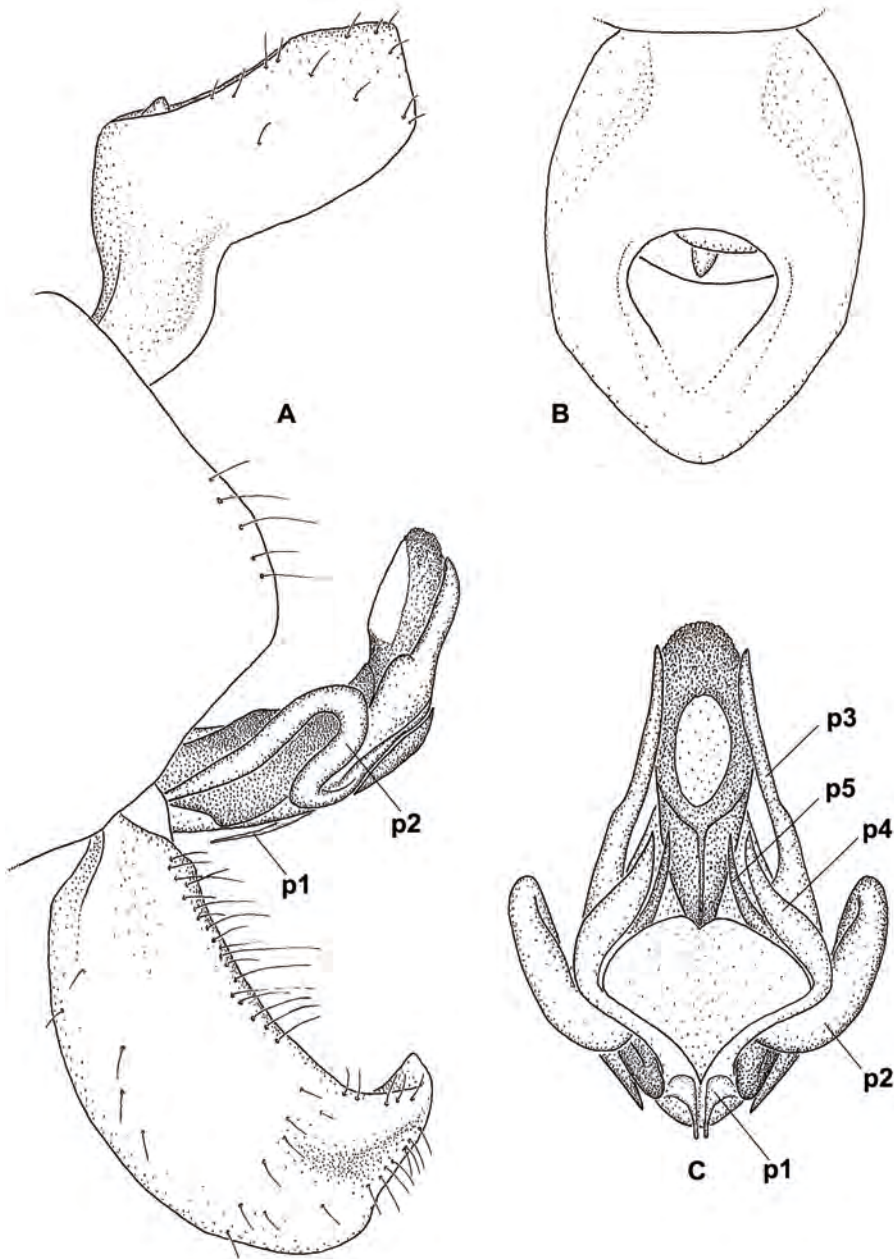


Fig 6: *Philbyella gnezdilovi* nov.sp., holotype: Genitalia in lateral view (A); anal segment in dorsal view (B); Apex of aedeagus in caudal view (C).

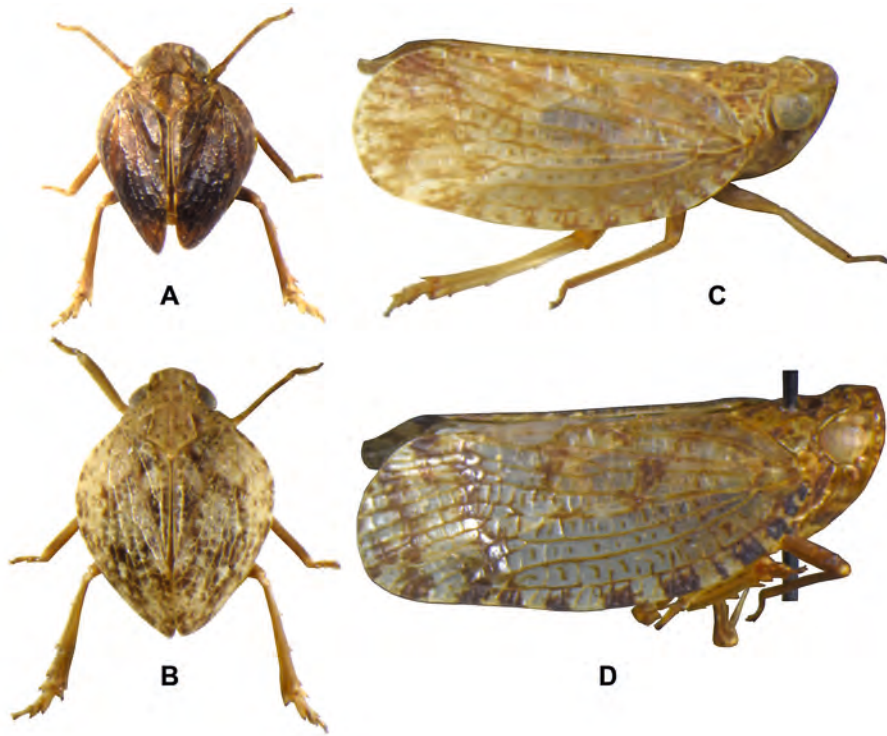


Fig 7: *Philbyella gnezdilovi* nov.sp.: holotype male (A); paratype female (B); *Mikewilsonia kunzi* nov.gen. nov.sp.: holotype male (C), paratype female (D).

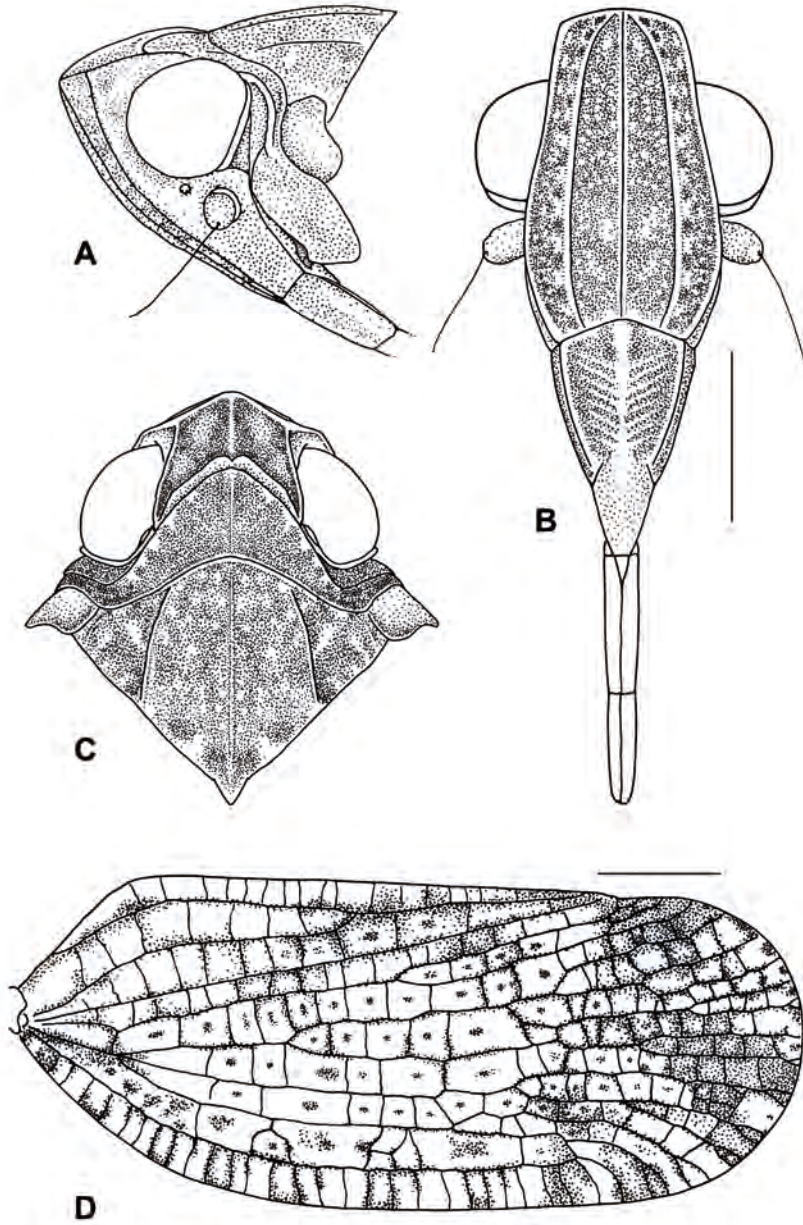


Fig 8: *Mikewilsonia kunzi* nov.gen. nov.sp., holotype: Head and fore body in lateral (A), frontal (B) and dorsal (C) view; left fore wing (D). Drawings by M. Stöckmann.

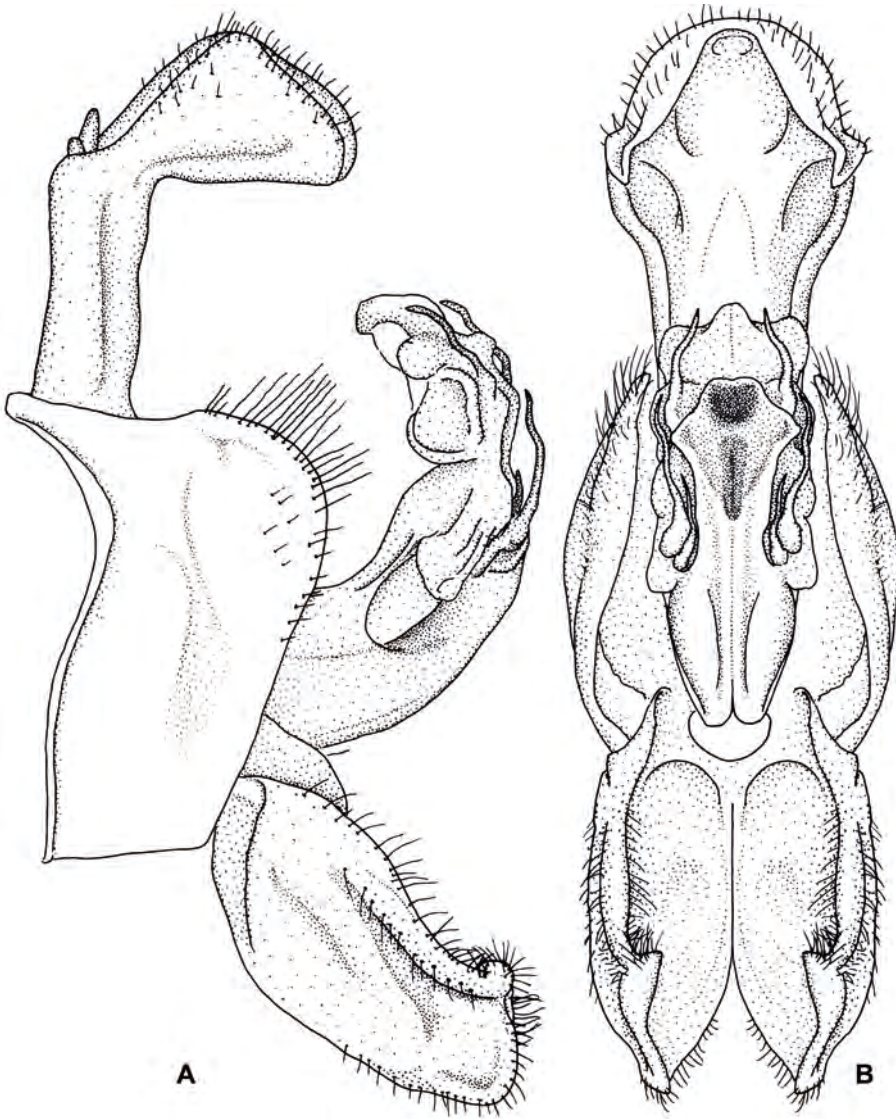


Fig 9: *Mikewilsonia kunzi* nov.gen. nov.sp., holotype: Genital segment in lateral and caudal view. Drawings by M. Stöckmann.

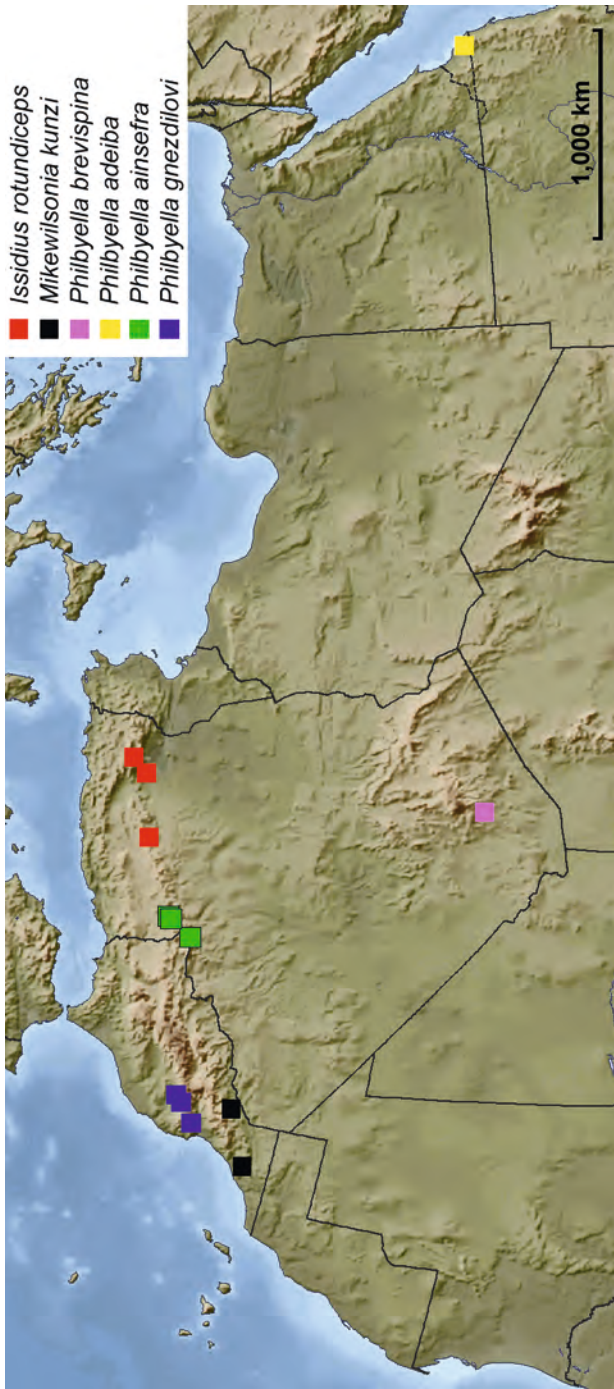


Fig. 10: Distributional records of Nogodinidae in North Africa. Basis for the map: "Africa_topography_map_with_borders.png" by "Barnse", <https://commons.wikimedia.org/wiki>