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Annales de la Société entomologique de France (N.S.)
International Journal of Entomology

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/tase20

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To cite this article: Abdelkader Dermane, Leila Bendifallah, Denis Michez & Thomas J. Wood (2021): *Andrena* species (Hymenoptera: Apoidea: Andrenidae) from Western Algeria, with a preliminary assessment of their pollen preferences, Annales de la Société entomologique de France (N.S.), DOI: 10.1080/00379271.2021.1896383

To link to this article: https://doi.org/10.1080/00379271.2021.1896383

Published online: 14 Apr 2021.

Annales de la Société entomologique de France (N.S.), 2021
https://doi.org/10.1080/00379271.2021.1896383

Andrena species (Hymenoptera: Apoidea: Andrenidae) from Western Algeria, with a preliminary assessment of their pollen preferences

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(Accepté le 24 février 2021; publié en ligne le 14 avril 2021)

Summary. Algeria, the largest country in Africa, has a species rich bee fauna because of its ecological conditions, climate and diversified flora. The present work represents a list of the genus *Andrena* Fabricius, 1775 in western Algeria. The survey, carried out during the period 2017–2019, has allowed identification of 56 species of *Andrena* in a total of 787 specimens (496 females, 291 males), with one species new for the fauna of Algeria, *Andrena* (*Aenandrena*) *hystrix* Schmiedeknecht, 1883. Preliminary pollen preferences of the most common species were analysed in Algeria for the first time, comprising seven polylectic and 12 oligolectic species. The current work provides a baseline for future studies on the diet of Andrena and is one of the first studies on the floral preferences of North African bees.

Résumé. Les espèces d'*Andrena* (Hymenoptera : Apoidea : Andrenidae) de l'Ouest algérien, avec une évaluation préliminaire de leurs préférences polliniques. L'Algérie, plus grand pays d'Afrique, possède une faune d'abeilles riche en espèces du fait de ses conditions écologiques, de son climat et de sa flore diversifiée. Le présent travail représente une liste du genre *Andrena* Fabricius, 1775 de l'Ouest algérien. L'inventaire, réalisé au cours de la période 2017–2019, a permis d'identifier 56 espèces d'*Andrena* pour un total de 787 spécimens (496 females, 291 males), avec une espèce nouvelle pour la faune de l'Algérie, *Andrena* (*Aenandrena*) *hystrix* Schmiedeknecht, 1883. Les préférences polliniques préliminaires des espèces les plus communes d'Algérie ont été analysées pour la première fois, comprenant sept espèces polyléctiques et 12 espèces oligoléctiques. Le travail actuel fournit une base de référence pour les futures études sur le régime alimentaire des *Andrena* et constitue l'une des premières études sur les préférences florales des abeilles d'Afrique du Nord.

http://www.zoobank.org/urn:lsid:zoobank.org:pub:77AC29EE-9414-4356-81C0-DF5A547F9221

Keywords: dietary ecology; Mediterranean; North Africa; biodiversity; desert; faunistics

Wild bees are ecologically and economically important as pollinators of many wild and cultivated plants (Ollerton et al. 2011). The genus *Andrena* Fabricius, 1775 (Hymenoptera: Andrenidae), generally known as sand bees or mining bees (Michener 2007), is primarily distributed across the Holarctic, being absent from South America, most of Southeast Asia, Oceania, and only uncommonly found in Sub-Saharan Africa. The genus includes about 1500 valid species (Gusenleitner & Schwarz 2002), but the number is likely to approach 2000 species (Dubitzky et al. 2010). *Andrena* species are some of the most common and abundant bee species in the Holarctic, some of which can be considered as the most important pollinators of flowering plants and crops (Delaplane & Mayer 2000). All members of the genus excavate their nests in the soil and use pollen and nectar as the main food source for their larvae (Michez et al. 2019). *Andrena* species show great variation in the pollen they collect. There are polylectic species, collecting from a wide variety of botanical families, while others are oligolectic, collecting only from a single botanical family or even genus (Wood & Roberts 2018).

During the last two centuries, several studies on wild bees in Algeria have been carried out by Pérez (1895, 1902), Saunders (1908), Alfken (1914), Morice (1916), Schulthess (1924) and Warncke (1974). More recently, other studies in eastern and central Algeria have been carried out by Louadi et al. (2008), Benarfa et al. (2013), Bendifallah et al. (2013), Cherair et al. (2013) and Djouama et al. (2016). According to Lhomme et al. (2020), the estimation of the diversity of Apoidea in Algeria is probably around 900 species. Unfortunately, at the present time, there is no comprehensive national checklist. However, Warncke (1974) listed 199 species of

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Published online 14 Apr 2021

Andrena in North Africa, 147 of which have been recorded in Algeria (Cherair et al. 2013).

In western Algeria, no recent study has been carried out on the genus *Andrena* since the work of Warncke (1974). The present study aims on the one hand to contribute towards a list of *Andrena* species across three regions of western Algeria and, on the other hand, to study their pollen preferences based on the analysis of the scopal pollen recovered from the specimens, in order to make a preliminary assessment of the diet and the degree of food specialisation of the main captured species. This preliminary assessment of the diet is being carried out in Algeria for the first time and it is one of the first studies of the pollen preferences of North African bees (see also Müller 2014, 2018). Our results provide important baseline data on this group in western Algeria, which can be used in future studies in comparison with other species of the same genus in the West Palearctic region.

Materials and methods

Sampling and collection of specimens

The sampling was carried out in the western part of Algeria, within two regions located in the highlands of the north-west of the country (Tissemsilt and Tiaret), and one located in the pre-Saharan Atlas of south-western Algeria (Naama) (Figure 1). The first region was Tissemsilt, where the survey was conducted at two stations, the Cemetery of Sidi El Houari [35°35′N 1°48′E, 949 m] with a semi-arid climate (rainfall 433 mm/year), and Theniet El Had National Park (THNP) [35°50′N 1°58′E, 1348 m] with a sub-humid climate (rainfall 812.3 mm/year). The substrate is rocky and interspersed with the presence of dense herbaceous vegetation, mostly medicinal plants such as *Anacyclus clavatus* (Desf.) Pers. (Asteraceae), and *Andryala integrifolia* L. (Asteraceae). The second region was Tiaret: Bouguara [35°34′N 1°55′E, 818 m] with a semi-arid climate (rainfall 529 mm/year). The substrate is sandy. The main vegetation was *Sinapis arvensis* L. (Brassicaceae) and *Hedysarum spinosissimum* L. (Fabaceae). The last region was Naama: Tiout [32°45′N 0°25′W, 1120 m] with an arid climate (rainfall 241.4 mm/year). The substrate is mainly arid steppe and the most widespread spontaneous flora in this site are *Brassica rapa* L. (Brassicaceae), *Moricandia arvensis* L. (Brassicaceae) and *Reseda luteola* L. (Resedaceae) (Figure 2). The collection of specimens was carried out either with an entomological net, mostly for large and fast flying bees, or with a hand-held aspirator, especially for small bees. All specimens were identified by TJW. The bees are kept at the Laboratory of Zoology of the University of Mons (Belgium). The collection of plant pollen, used as comparison material, was carried out in each region at the same time as the collection of bees in order to facilitate accurate identification of bee collected pollen. Most of the plant species were identified by Prof. D. Habibe of the University of Tiaret (Algeria). The works of Quezel & Santa (1962) and Beniston & Beniston (1984) were also used.

Pollen identification

The scopal pollen of *Andrena* females collected over the period 2017–2019 was analysed by light microscopy according to the method described by Westrich & Schmidt (1986). Pollen that was not clearly retained in the scopae was not studied as it could come from non-host plants visited for nectar (Wood et al. 2016). Individuals with a scopal load of less than 25% were excluded from the analyses because they were at risk of

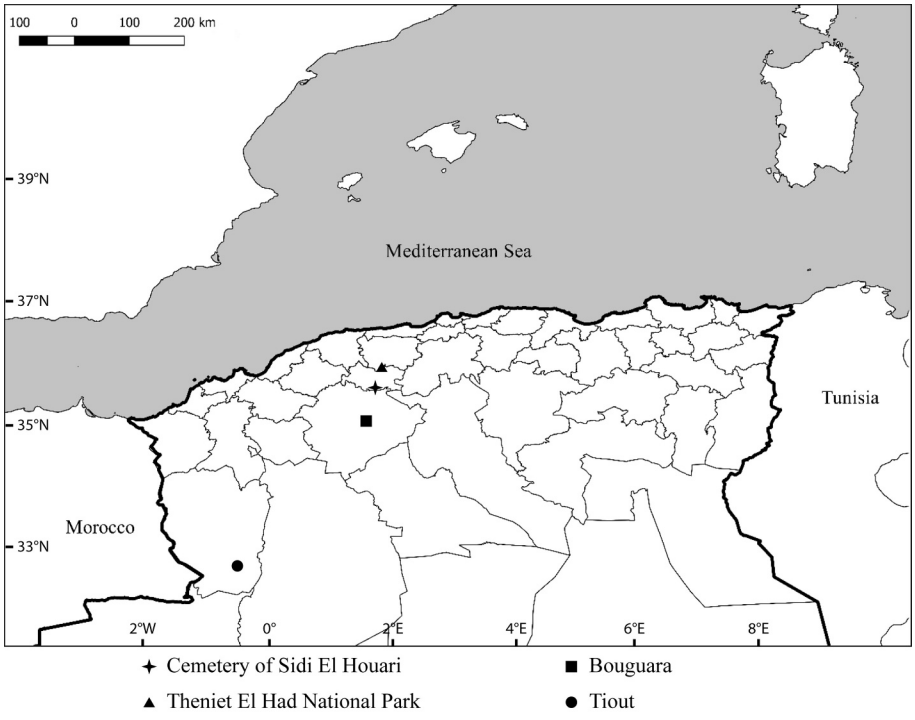

Figure 1. Map showing collecting localities of material examined during this project.

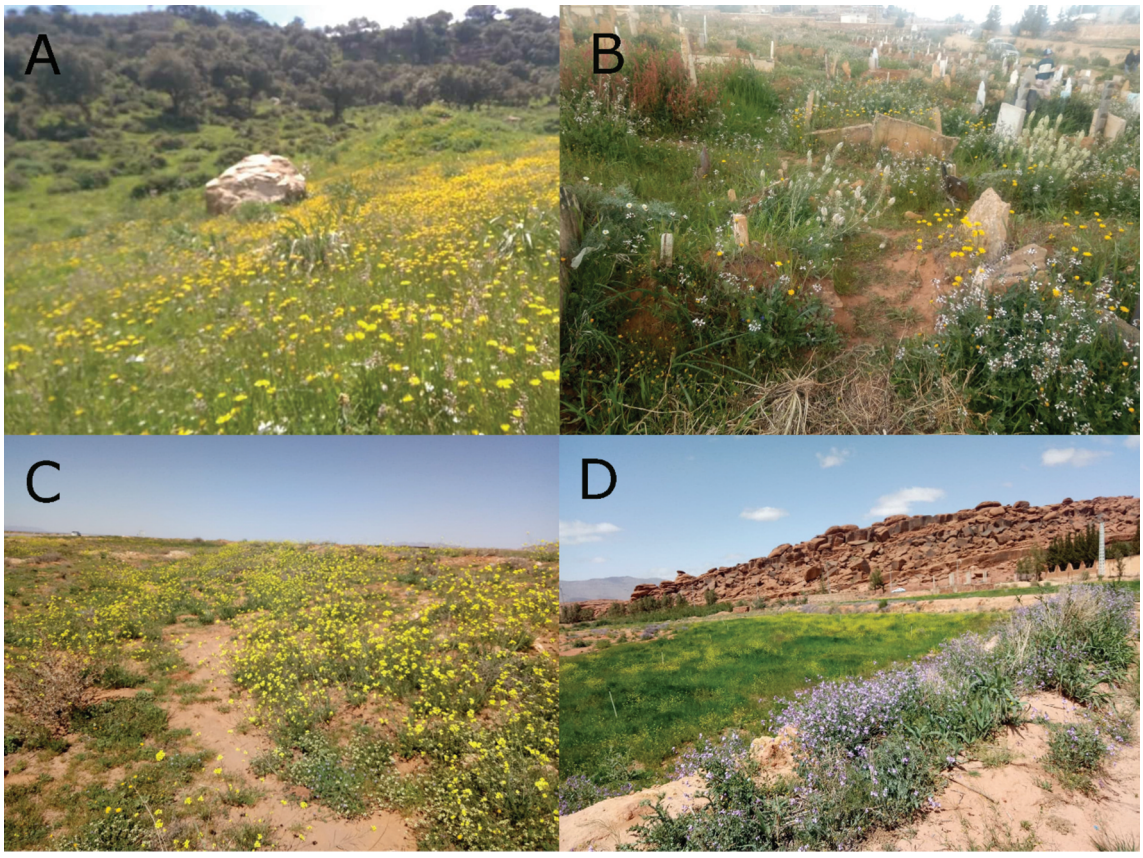

Figure 2. Sampled sites for *Andrena* species in Western Algeria. **A**, Tissemsilt (Theniet Had National Park); **B**, Tissemsilt (Cemetery of Sidi El Houari); **C**, Tiaret (Bouguara); **D**, Naama (Tiout) (Photos: A. Dermane).

contamination by non-foraged pollen. For others, the load ranged from 25 to 100%. Pollen grains were removed from the scopae using an entomological pin and then transferred to a drop of water placed on a slide. They were then lightly agitated to allow segregation of the agglomerated grains. Each slide was gently heated to allow the water to be absorbed and to allow the pollen grains to reach their maximum size, while allowing the excess water to evaporate. Fuchsin-stained glycerine jelly was introduced before sealing the slides with cover slips (Wood et al. 2016). Pollen grains were counted using a tripartite division of each lamina to reduce the risk of double counting, and at a magnification of 400× (Westrich & Schmidt 1986; Wood et al. 2016). Pollen identification was carried out using an exhaustive inventory of flowering plants in each study site. The analysis of this pollen allowed us to provide information on the diet according to the method described by Müller & Kuhlmann (2008).

Results

This survey resulted in the collection of 787 specimens (496 females, 291 males) belonging to the genus *Andrena*, comprising 56 species from 30 subgenera (Table 1), among which a new species for the fauna of Algeria was identified: *Andrena* (*Aenandrena*) *hystrix* Schmiedeknecht, 1883. The scopal pollen of 132 individuals from 19 species was analysed under the microscope, and 22 morphotypes from 11 botanical families were detected. Based on these data, 12 species were classified as oligolectic (63.3%) and seven as polylectic (36.7%) (Table 2). The ultimate classification was informed by our understanding of the choices made by these species elsewhere in their range (e.g. Baldock et al. 2018).

Subgenus *Aenandrena* Warncke, 1968
Andrena (*Aenandrena*) *hystrix* Schmiedeknecht, 1883 (Figure 3)

New data. Tissemsilt: THNP 22.IV.2017 (1♀) on *Asphodelus microcarpus* Viv. leg. A. Dermane. New species for Algeria.

Flight period. Collected only once on 22 April 2017 in Tissemsilt (THNP).

Table 1. List of *Andrena* species inventoried in Western Algeria (Tissemsilt, Tiaret, Naama, *new for Algeria).

Subgenus	Species	Number of specimens
Aenandrena Warncke, 1968	*A. hystrix* Schmiedeknecht, 1883	1 (1♀) *
Aciandrena Warncke, 1968	*A. fulica* Warncke, 1974	1 (1♂)
Agandrena Warncke, 1968	*A. agilissima* (Scopoli, 1770)	11 (10♀, 1♂)
Campylogaster Dours, 1873	*A. pruinosa succinea* Dours, 1872	1 (1♀)
Carandrena Warncke, 1968	*A. aerinifrons* Dours, 1873	26 (15♀, 11♂)
	A. deserta Warncke, 1974	5 (3♀, 2♀)
	A. nigroviridula Dours, 1873	3 (3♀)
	A. reperta Warncke, 1974	1 (1♀)
Chlorandrena Pérez, 1890	*A. boyerella* Dours, 1872	7 (7♀)
	A. humilis Imhoff, 1832	1 (1♂)
	A. isis Schmiedeknecht, 1900	4 (4♀)
	A. microcardia Pérez, 1895	3 (3♀)
	A. rhyssonota Pérez, 1895	9 (6♀, 3♂)
Chrysandrena Hedicke, 1933	*A. hesperia* Smith, 1853	6 (5♀, 1♂)
Distandrena Warncke, 1968	*A. mariana mica* Warncke, 1974	1 (1♀)
	A. mariana solda Warncke, 1974	1 (1♀)
	A. obsoleta Warncke, 1967	23 (21♀, 2♂)
	A. purpurascens Pérez, 1895	6 (5♀, 1♂)
Fumandrena Warncke, 1975	*A. djelfensis* Pérez, 1895	1 (1♀)
	A. pandosa Warncke, 1968	4 (♀)
Graecandrena Warncke, 1968	*A. impunctata* Pérez, 1895	23 (12♀, 11♂)
	A. totana Warncke, 1974	21 (4♀, 17♂)
	A. verticalis Pérez, 1895	18 (4♀, 14♂)
Hyperandrena Pittioni, 1948	*A. bicolorata* (Rossi, 1790)	15 (14♀, 1♂)
	A. florentina Magretti, 1883	1 (1♀)
Lepidandrena Hedicke, 1933	*A. sardoa* Lepeletier, 1841	50 (48♀, 2♂)
Leucandrena Hedicke, 1933	*A. leptopyga* Pérez, 1896	5 (3♀, 2♂)
Melanapis Cameron, 1902	*A. fuscosa* Erichson, 1835	61 (36♀, 25♂)
Melandrena Pérez, 1890	*A. albifacies* Alfken, 1927	1 (1♀)
	A. albopunctata (Rossi, 1792)	2 (2♀)
	A. limata Smith, 1853	9 (8♀, 1♂)
	A. morio Brullé, 1832	51 (10♀, 41♂)
	A. nigroaenea (Kirby, 1802)	3 (2♀,1♂)
Melittoides Friese, 1921	*A. innesi* Gribodo, 1894	2 (2♀)
Micrandrena Ashmead, 1899	*A. tenuistriata* Pérez, 1895	4 (3♀, 1♂)
Nobandrena Warncke, 1968	*A. compta* Lepeletier, 1841	7 (4♀, 3♂)
Notandrena Pérez, 1890	*A. fulvicornis* Schenck, 1853	3 (3♂)
	A. leucura Warncke, 1974	2 (2♀)
Parandrena Robertson, 1897	*A. tunetana* Schmiedecknecht, 1900	1 (1♀)
Parandrenella Popov, 1958	*A. tebessana* Scheuchl, Benarfa & Louadi, 2011	4 (2♀, 2♂)
Plastandrena Hedicke, 1933	*A. bimaculata atrorubicata* Dours, 1872	9 (8♀, 1♂)
Poliandrena Warncke, 1968	*A. melaleuca* Pérez, 1895	7 (7♀)
Rufandrena Warncke, 1968	*A. orbitalis* Morawitz, 1871	1 (1♀)
	A. rufiventris Lepeletier, 1841	21 (4♀, 17♂)
Simandrena Pérez, 1890	*A. biskrensis* Pérez, 1895	1 (1♀)
Suandrena Warncke, 1968	*A. cyanomicans fratella* Warncke, 1968	7 (3♀, 4♂)
	A. leucocyanea Pérez, 1895	5 (5♀)
	A. savignyi Spinola, 1838	6 (6♀)
Taeniandrena Hedicke 1933	*A. poupillieri* Dours, 1872	5 (5♀)
Truncandrena Lanham, 1949	*A. ferrugineicrus* Dours, 1872	39 (18♀, 21♂)
	A. medeninensis Pérez, 1895	4 (4♀)
	A. minapalumboi Gribodo, 1894	25 (25♀)
	A. varia Pérez, 1895	16 (3♀, 13♂)
Thysandrena Lanham, 1949	*A. numida* Lepeletier, 1841	5 (2♀, 3♂)
Zonandrena Hedicke, 1933	*A. flavipes* Panzer, 1799	237 (155♀, 82♂)
	A. vulcana Dours, 1873	1 (1♀)
Total 30	56	787 (496♀,291♂)

Table 2. Host-plant spectrum and inferred category of host range in western Algeria of *Andrena* species. n, total number of pollen loads; N, number of pollen loads from different localities. Plant taxa: API, Apiaceae; ASP, Asphodelaceae; AST, Asteraceae; BOR, Boraginaceae; BRA, Brassicaceae; FAB, Fabaceae; LAM, Lamiaceae; PAP, Papaveraceae; RES, Resedaceae; PAP, Papaveraceae; MAL, Malvaceae.

Species	n	N	Results of microscopic analysis of pollen loads (% pollen grains)	% pure loads of preferred host	% loads with preferred host	Host range
A. (*Agandrena*) *agilissima*	10	4	BRA 58.2, AST 23.1, API 8.9, LAM 5.3, RES 4.5	16.7	66.7	Possibly polylectic
A. (*Carandrena*) *aerinifrons*	8	4	BRA 90, AST 10	83.3	83.3	Probably oligolectic (Brassicaceae)
A. (*Chlorandrena*) *boyerella*	5	2	AST 100	100	100	Probably oligolectic (Asteraceae)
A. (*Chlorandrena*) *isis*	3	2	AST 100	100	100	Probably oligolectic (Asteraceae)
A. (*Chlorandrena*) *microcardia*	4	2	AST 100	100	100	Probably oligolectic (Asteraceae)
A. (*Chlorandrena*) *rhyssonota*	4	3	AST 100	100	100	Probably oligolectic (Asteraceae)
A. (*Chrysandrena*) *hesperia*	4	2	AST 100	100	100	Probably oligolectic (Asteraceae)
A. (*Distandrena*) *obsoleta*	16	3	BRA 97.2, RES 2.8	87.5	100	Broadly oligolectic (Brassicaceae)
A. (*Hyperandrena*) *bicolorata*	8	4	BRA 93.7, AST 6.3	87.5	100	Probably oligolectic (Brassicaceae)
A. (*Lepidandrena*) *sardoa*	8	3	ASP (Asphodelus) 100	100	100	Narrowly oligolectic (*Asphodelus*)
A. (*Melanapis*) *fuscosa*	8	4	BRA 75.9, RES 22.5, AST 0.9, LAM 0.8	33.3	75	Possibly polylectic with a preference for Brassicaceae
A. (*Melandrena*) *limata*	6	4	RES 31.4, BRA 28.6, ASP 25.7, LAM 5.7	0	50	Polylectic
A. (*Melandrena*) *morio*	6	4	BRA 62.5, AST 15.2, RES 9.7, LAM 7.3, ASP 5.5	40	80	Polylectic
A. (*Nobandrena*) *compta*	4	2	BRA 96.6, AST 3.4	75	100	Probably oligolectic (Brassicaceae)
A. (*Poliandrena*) *melaleuca*	5	2	RES 65, BRA 35	60	100	Possibly polylectic
A. (*Suandrena*) *leucocyanea*	5	3	BRA 96.4, LAM 3.6	60	100	Possibly oligolectic (Brassicaceae)
A. (*Suandrena*) *savignyi*	5	2	BRA 100	100	100	Probably oligolectic (Brassicaceae)
A. (*Truncandrena*) *ferrugineicrus*	10	3	BRA 81.3, RES 13.7, BOR 5	42.9	85.7	Possibly polylectic
A. (*Zonandrena*) *flavipes*	13	4	BRA 57.9, AST 24.7, RES 12.9, LAM 2.9, API 0.4, MAL 0.5, PAP 0.4, ONA 0.4, API 0.3	23.1	76.9	Polylectic s.s

Subgenus *Aciandrena* Warncke, 1968
Andrena (*Aciandrena*) *fulica* Warncke, 1974

Published data. Mascara (Warncke 1974), Biskra (Djouama et al. 2016).

New data. Tiaret: Bouguara 28.V.2018 (1♂) on *Reseda alba* L. leg. A. Dermane.

Flight period. Collected only once on 28 May 2018 in Tiaret (Bouguara). Between March and May (Warncke 1974; Djouama et al. 2016).

Subgenus *Agandrena* Warncke, 1968
Andrena (*Agandrena*) *agilissima* (Scopoli, 1770)

Published data. Alger, Annaba, Constantine, Biskra (Saunders 1908), Alger, Oran (Alfken 1914), Tlemcen, Biskra (Warncke 1974), Tebessa, Khenchela (Benarfa et al. 2013), Biskra (Djouama et al. 2016).

New data. Tissemsilt: Cemetery (1♂) 12.IV.2019 on *Reseda alba* L. (4♀) 21.IV.2019 on *Thymus serpyllum* L. Tissemsilt: THNP 26.V.2017 (1♀) on *Reseda alba* L.

Figure 3. *Andrena* (*Aenandrena*) *hystrix* Schmiedeknecht, 1883. **A**, Female profile; **B**, female tergites.

Tiaret: THNP 28.V.2018 (1♀). Naama: Tiout 26.V.2019 (4♀) on *Reseda alba* L. leg. A. Dermane.

Flight period. From April to May (Tissemsilt, Naama). Between February and June (Saunders 1908; Alfken 1914; Warncke 1974; Benarfa et al. 2013; Djouama et al. 2016).

Subgenus *Campylogaster* Dours, 1873
Andrena (*Campylogaster*) *pruinosa succinea* Dours, 1872

Published data. Alger (Schulthess 1924), Oran, Constantine, Setif, Ain Sefra, Biskra (Warncke 1974), Tebessa (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 12.IV.2019 (1♀) on *Thymus serpyllum* L. leg. A. Dermane.

Flight period. Observed only once on 12 April 2019 in Tissemsilt (Cemetery). December, March and May (Warncke 1974), February (Benarfa et al. 2013).

Subgenus *Carandrena* Warncke, 1968
Andrena (*Carandrena*) *aerinifrons* Dours, 1873

Published data. Alger (Benoist 1961), Oran, Batna et Biskra (Warncke 1974), Tebessa (Benarfa et al. 2013), Biskra (Djouama et al. 2016).

New data. Tissemsilt: Cemetery 28.IV.2019 (3♂) on *Reseda alba* L. 14.III.2019 (1♀) on *Raphanis raphanistrum* L. 21.III.2019 (1♀) on *Sinapis arvensis* L. Tissemsilt: THNP 17.V.2017 (3♀) on *Sinapis arvensis* L. Naama: Tiout 27.III.2019 (3♀) on *Brassica rapa* L. Tiaret: Bouguara 28.III.2018 (3♂) on *Raphanis raphanistrum* L. 7.IV.2018 (3♂) on *Sinapis arvensis* L. 30.IV.2018 (2♂) on *Sinapis arvensis* L. 14.III.2018 (4♀) on *Sinapis arvensis* L. 15.IV.2018 (3♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. From March to April (Tissemsilt, Tiaret and Naama). Between March and May (Benoist 1961; Warncke 1974; Benarfa et al. 2013; Djouama et al. 2016).

Andrena (*Carandrena*) *deserta* Warncke, 1974

Published data. Biskra (Warncke 1974).

New data. Tiaret: Bouguara 22.IV.2018 (2♂) on *Sinapis arvensis* L. 22.IV.2018 (3♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. During the month of April, in Tiaret. Mid-February, early March (Warncke 1974).

Andrena (*Carandrena*) *nigroviridula* Dours, 1873

Published data. Mascara, Ouarsnis, Alger, Constantine, Saida (Warncke 1974).

New data. Tiaret: Bouguara 15.IV.2018 (3♂) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. During the month of April, in Tiaret. Mid-April, mid-June (Warncke 1974).

Andrena (*Carandrena*) *reperta* Warncke, 1974

Published data. Biskra (Warncke 1974).

New data. Tiaret: Bouguara 15.IV.2018 (3♂) on *Raphanus raphanistrum* L. leg. A. Dermane.

Flight period. During the month of April, in Tiaret. March (Warncke 1974).

Subgenus *Chlorandrena* Pérez, 1890
Andrena (*Chlorandrena*) *boyerella* Dours, 1872

Published data. Oran (Warncke 1974).

New data. Tissemsilt: Cemetery 21.IV.2019 (2♀) on *Anacyclus clavatus* L. Tissemsilt: THNP 2.VI.2017 (5♀) on *Anacyclus clavatus* L. leg. A. Dermane.

Flight period. On 2 May 2017 in Tissemsilt (THNP) and 21 April 2019 in Tissemsilt (Cemetery). Mid-April, mid-June (Warncke 1974).

Andrena (*Chlorandrena*) *humilis* Imhoff, 1832

Published data. Oran, Teniet El Haad (Warncke 1974)

New data. Tiaret: Bouguara 28.III.2018 (1♂) on *Urospermum picroides* L. leg. A. Dermane.

Flight period. Observed only once on 28 March 2018 in Tiaret (Bouguara). Mid-April, late May (Warncke 1974).

Andrena (*Chlorandrena*) *isis* Schmiedeknecht, 1900

Published data. Khenchela (Saunders 1908), Biskra, Ghardaia, Bechar (Warncke 1974), Biskra (Djouama et al. 2016).

New data. Naama: Tiout 29.III.2019 (3♀) on *Hypochaeris achyrophorus* L. Tiaret: Bouguara 14. III.2018 (1♀) on *Hypochaeris achyrophorus* L. 15. IV.2018, leg. A. Dermane.

Flight period. During the month of March, in Naama. Between February and June (Saunders 1908; Warncke 1974; Djouama et al. 2016).

Andrena (*Chlorandrena*) *microcardia* Pérez, 1895

Published data. Constantine (Warncke 1974).

Flight period. From 14 March 2018 in Tiaret (Bouguara) and 7 April 2019 in Naama (Tiout). Between May and June (Warncke 1974).

New data. Naama: Tiout 7.IV.2019 (2♀) on *Hypochaeris achyrophorus* L. Tiaret: Bouguara 14.III.2018 (1♀) on *Hypochaeris achyrophorus* L. leg. A. Dermane.

Andrena (*Chlorandrena*) *rhyssonota* Pérez, 1895

Published data. Alger (Saunders 1908; Warncke 1974), Tebessa (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 21.IV.2019 (2♀) on *Urospermum picroides* L. Naama: Tiout 17.III.2019 (2♀) on *Urospermum picroides* L. Tiaret: Bouguara 14. III.2019 (1♂) on *Urospermum picroides* L. 5.V.2019 (1♂) on *Anacyclus clavatus* L. 12.V.2019 (1♂) on *Calendula arvensis* L. 12.V.2019 on (2♀) *Anacyclus clavatus* L. leg. A. Dermane.

Flight period. From March to May (Tissemsilt, Tiaret and Naama). Between March and June (Saunders 1908; Warncke 1974; Benarfa et al. 2013).

Subgenus *Chrysandrena* Hedicke, 1933
Andrena (*Chrysandrena*) *hesperia* Smith, 1853

Published data. Oran (Warncke 1974), Biskra (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 28.III.2019 (3♀) on *Urospermum picroides* L. Tissemsilt: THNP 21.IV.2017 (1♂) on *Urospermum picroides* L. Tiaret: Bouguara 14. III.2018 (2♀) on *Urospermum picroides* L. leg. A. Dermane.

Flight period. From March to April (Tissemsilt et Tiaret). Between March and April (Warncke 1974; Benarfa et al. 2013).

Subgenus *Distandrena* Warncke, 1968
Andrena (*Distandrena*) *mariana mica* Warncke, 1974

Published data. Biskra (Saunders 1908), Ghardaia, Bechar, Biskra, Touggourt (Warncke 1974), Biskra, Ghardaia (Djouama et al. 2016).

New data. Tissemsilt: Cemetery 21.III.2019 (1♀) on *Raphanus raphanistrum* L. leg, A. Dermane.

Flight period. Observed only once on 21 March 2019 in Tissemsilt (Cemetery). Between February and March (Saunders 1908; Warncke 1974; Djouama et al. 2016).

Andrena (*Distandrena*) *mariana solda* Warncke, 1974

Published data. Hussein Dey (Warncke 1974).

New data. Tiaret: Bouguara 7.IV.2018 (1♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. Observed only once, on 7 April 2018 in Tiaret (Bouguara). Late March (Warncke 1974).

Andrena (*Distandrena*) *obsoleta* Warncke, 1967

Published data. Alger (Alfken 1914; Benoist 1961), Oran, Batna, Biskra (Warncke 1974). Tebessa, Khenchela, Souk-Ahras, Oum El Bouaghi (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 21.III.2019 (1♀) on *Sinapis arvensis* L. Tissemsilt: THNP 5.IV.2017 (6♀) on *Sinapis arvensis* L. Tiaret: Bouguara 15.IV.2018 (1♂) on *Sinapis arvensis* L. 21.III.2018 (10♀) on *Sinapis arvensis* L.15.IV.2018 (4♀) on *Raphanus raphanistrum* L. 15. IV.2018 (1♂) on *Reseda alba* L. leg. A. Dermane.

Flight period. From March to June (Tissemsilt, Tiaret). Between February, June (Alfken 1914; Benoist 1961; Warncke 1974; Benarfa et al. 2013).

Andrena (*Distandrena*) *purpurascens* Pérez, 1895

Published data. Alger, Constantine (Saunders 1908), Constantine (Benoist 1961), Oran, Constantine (Warncke 1974), Biskra (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 28.III.2019 (1♂) on *Sinapis arvensis* L. Tiaret: Bouguara 7.IV.2018 (4♂) on *Sinapis arvensis* L. 15.IV.2018 (1♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. From March to April (Tissemsilt, Tiaret). Between February and May (Saunders 1908; Benoist 1961; Warncke 1974), December (Benarfa et al. 2013).

Subgenus *Fumandrena* Warncke, 1975

Andrena (*Fumandrena*) *djelfensis* Pérez, 1895

Published data. Oran, Teniet El Haad, Alger, Ammi Mousa, Constantine, Tipaza, Djelfa (Warncke 1974).

New data. Tissemsilt: THNP 19.V.2017 (1♀) on *Silybum marianum* L. leg. A. Dermane.

Flight period. Captured only once on 19 April 2017 in Tissemsilt (THNP). Between March and June (Warncke 1974).

Andrena (*Fumandrena*) *pandosa* Warncke, 1968

Published data. Hammam Bou Hadjar, Oran, Tiaret, Biskra (Warncke 1974).

New data. Tissemsilt: Cemetery 21.IV.2019 (4♀) on *Reseda alba* L. leg. A. Dermane.

Flight period. During the month of April, in Tissemsilt. Mid-February, March and mid-April (Warncke 1974).

Subgenus *Graecandrena* Warncke, 1968

Andrena (*Graecandrena*) *impunctata* Pérez, 1895

Published data. Biskra (Saunders 1908), Tlemcen, Oran, Tipaza, Alger, Constantine, Batna (Warncke 1974), Tebessa (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 28.III.2019 (1♂) on *Raphanus raphanistrum* L. Tiaret: Bouguara 7.IV.2018 (9♂) on *Sinapis arvensis* L. 15.IV.2018 (1♂) on *Raphanus raphanistrum* L, 28.III.2018 (9♀) on *Sinapis arvensis* L.7.IV.2018 (2♀) on *Raphanus raphanistrum* L. 14.V.2018 (1♀) on *Reseda alba* L. leg. A. Dermane.

Flight period. From March to May (Tissemsilt, Tiaret). Between April and June (Saunders 1908), between March and June (Warncke 1974), March (Benarfa et al. 2013).

Andrena (*Graecandrena*) *totana* Warncke, 1974

Published data. Oran, Tlemcen, Hammam Bou Hadjar, Alger, Setif, Souk Ahras (Warncke 1974).

New data. Tissemsilt: Cemetery 7.IV.2019 (12♂) on *Reseda alba* L. 21.IV.2019 (1♀) on *Sinapis arvensis* L. 12. V.2019 (1♀) on *Reseda alba* L. Tiaret: Bouguara 12.IV.2018 (5♂) on *Reseda alba* L. 22.IV.2018 (1♀) on *Sinapis arvensis* L. 30.IV.2018 (1♀) on *Reseda alba* L. leg. A. Dermane.

Flight period. During the month of April, in Tissemsilt. Early April, mid-May (Warncke 1974).

Andrena (*Graecandrena*) *verticalis* Pérez, 1895

Published data. Oran, Souk Ahrras, Biskra, Ghardaia (Warncke 1974).

New data. Tissemsilt: Cemetery 15.IV.2019 (12♂) on *Daucus carota* L. 21.IV.2019 (1♀) on *Sinapis arvensis* L. Tiaret: Bouguara 5.IV.2018 (1♂) on *Anethum graveolens* L. 30.IV.2018 (1♂) on *Sinapis arvensis* L. 15. IV.2018 (1♀) on *Sinapis arvensis* L. 15.V.2018 (1♀) on *Anethum graveolens* L. leg. A. Dermane.

Flight period. From April to May (Tissemsilt, Tiaret). Mid-March, early June (Warncke 1974).

Subgenus *Hyperandrena* Pittioni, 1948

Andrena (*Hyperandrena*) *bicolorata* (Rossi, 1790)

Published data. Alger (Saunders 1908; Warncke 1974), Setif (Warncke 1974), Tebessa (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 21.IV.2019 (5♀) on *Sinapis arvensis* L. Tissemsilt: THNP 5.V.2017 (4♀) on *Sinapis arvensis* L. Naama: Tiout 17.IV.2019 (1♀) on *Brassica rapa* L. Tiaret: Bouguara 30.IV.2018 (1♂) on

Sinapis arvensis L. 14.IV.2018 (4♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. During the month of April (Tissemsilt, Tiaret and Naama). Between January and April (Saunders 1908; Warncke 1974; Benarfa et al. 2013).

***Andrena* (*Hyperandrena*) *florentina* Magretti, 1883**

Published data. Biskra (Saunders 1908), Oran, Alger, Annaba (Warncke 1974), Constantine (Benarfa et al. 2013).

New data. Tiaret: Bouguara 7.V.2018 (1♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. Captured only once on 7 May 2018 in Tiaret (Bouguara). Between January and April (Saunders 1908; Benarfa et al. 2013), January and February, November (Warncke 1974).

Subgenus *Lepidandrena* Hedicke, 1933
***Andrena* (*Lepidandrena*) *sardoa* Lepeletier, 1841**

Published data. Alger, Oran, Constantine, Guelma, Media (Warncke 1974), Khenchela (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 28.V.2019 (3♀) on *Asphodelus microcarpus* Viv. Tissemsilt: THNP 28. III.2017 (2♂) on *Asphodelus microcarpus* Viv. 28.IV.2017 (20♀) on *Asphodelus microcarpus* Viv. 5.V.2017 (23♀) on *Asphodelus microcarpus* Viv. Tiaret: Bouguara 31.III.2018 (2♀) on *Asphodelus microcarpus* Viv. leg. A. Dermane.

Flight period. From April to May (Tissemsilt, Tiaret). Between March and June (Warncke 1974; Benarfa et al. 2013).

Subgenus *Leucandrena* Hedicke, 1933
***Andrena* (*Leucandrena*) *leptopyga* Pérez, 1895**

Published data. (*as Andrena maroccana* Benoist 1950): Mascara, Theniet El Had, Alger (Warncke 1974).

New data. Tissemsilt: Cemetery 7.IV.2019 (2♂) on *Reseda alba* L. 7.IV.2019 (2♀) on *Reseda alba* L. Tissemsilt: THNP 19.V.2017 (1♀) on *Reseda alba* L. leg. A. Dermane.

Flight period. From April to May, in Tissemsilt. March–May (Warncke 1974).

Subgenus *Melanapis* Cameron, 1902
***Andrena* (*Melanapis*) *fuscosa* Erichson, 1835**

Published data. Biskra (Saunders 1908), Oran, Mascara, Alger, Bechar, Biskra (Warncke 1974), Tebessa, Khenchela (Benarfa et al. 2013), Biskra (Djouama et al. 2016).

New data. Tissemsilt: Cemetery 7.IV.2019 (25♂) on *Reseda alba* L. 7.IV.2019 (5♀) on *Reseda alba* L. 14. IV.2019 (2♀) on *Raphanis raphantrium* L. 14.IV.2019 (17♀) on *Reseda alba* L. 3.V.2019 (3♀) on *Reseda alba* L. Tissemsilt: THNP 28.V.2017 (2♀) on *Sinapis arvensis* L. 5.V.2017 (2♀) on *Reseda alba* L. Naama: Tiout 3. IV.2019 (2♀) on *Brassica rapa* L. Tiaret: Bouguara 13. IV.2018 (3♀) on *Reseda alba* L. leg. A. Dermane.

Flight period. From April to May (Tissemsilt, Tiaret and Naama). Between February and August (Saunders 1908; Warncke 1974; Benarfa et al. 2013; Djouama et al. 2016).

Subgenus *Melandrena* Pérez, 1890
***Andrena* (*Melandrena*) *albifacies* Alfken, 1926**

Published data. Biskra, Beni Ounif, Bechar (Warncke 1974), Tebessa (Benarfa et al. 2013), Biskra (Djouama et al. 2016).

New data. Naama: Tiout 7.IV.2019 (1♀) on *Brassica rapa* L. leg. A. Dermane.

Flight period. Captured only once on 7 April 2019 in Naama (Tiout). Between February and July (Warncke 1974; Benarfa et al. 2013; Djouama et al. 2016).

***Andrena* (*Melandrena*) *albopunctata* (Rossi, 1792)**

Published data. Oran (Lepeletier de Saint-Fargeau 1841), Biskra, Medea, Constantine (Saunders 1908), Sidi Daho (Alfken 1914), Biskra (Warncke 1974), Tebessa, Constantine (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 14.III.2019 (1♀) on *Raphanus raphanistrum* L. 21.IV.2019 (1♀) *on Reseda alba* L. leg. A. Dermane.

Flight period. Observed only twice, between 14 March 2019 to 21 April 2019 in Tissemsilt (Cemetery). Between March and July (Saunders 1908; Alfken 1914; Warncke 1974; Benarfa et al. 2013).

***Andrena* (*Melandrena*) *limata* Smith, 1853**

Published data. (as *Andrena nitida* Müller, 1776). Oran, Alger (Warncke 1974).

New data. Tissemsilt: Cemetery 14.IV.2019 (2♀) on *Reseda alba* L. 21.IV.2019 (1♀) on *Raphanus raphanistrum* L. Tissemsilt: THNP 28.IV.2017 (1♀) on *Sinapis arvensis* L. Naama: Tiout 27.III.2019 (1♀) on *Brassica rapa* L. Tiaret: Bouguara 10.VI.2018 (1♂) on *Reseda alba* L. 7.V.2018 (3♀) on *Reseda alba* L. leg. A. Dermane.

Flight period. From March to May (Tissemsilt, Tiaret and Naama). March, April, June and July (Warncke 1974)

Andrena (*Melandrena*) *morio* Brullé, 1832

Published data. Oran (Lepeletier de Saint-Fargeau 1841), Biskra, Midea, El Tarf (Saunders 1908), Alger (Alfken 1914). Aïn Sefra, Biskra, El Kantara, Aflou, Laghouat (Warncke 1974), Khenchela, Oum El Bouaghi and Tebessa (Benarfa et al. 2013), Biskra (Djouama et al. 2016).

New data. Tissemsilt: Cemetery 28.III.2019 (6♂) on *Reseda alba* L. 21.V.2019 (26♂) on *Reseda alba* L. 21. V.2019 (6♀) on *Reseda alba* L. Tissemsilt: THNP 21. IV.2017 (2♀) on *Sinapis arvensis* L. Naama: Tiout 3. IV.2019 (1♀) on *Brassica rapa* L. Tiaret: Bouguara 30. IV.2018 (9♂) on *Reseda alba* L. 30.IV.2018 (1♀) on *Reseda alba* L. leg. A. Dermane.

Flight period. From March to April (Tissemsilt, Tiaret). Between February and July (Saunders 1908; Alfken 1914; Benarfa et al. 2013; Djouama et al. 2016).

Andrena (*Melandrena*) *nigroaenea* (Kirby, 1802)

Published data. Oran (Lepeletier de Saint-Fargeau 1841), Alger, Biskra, Mascara and Oran (Alfken 1914), Alger (Schulthess 1924), Tizi-Ouzou (Aouar-Sadli 2009), Souk Ahras, Khenchela, Oum El Bouaghi, Tebessa, Batna, Mila (Benarfa et al. 2013), Biskra (Djouama et al. 2016).

New data. Tissemsilt: Cemetery 27.III.2019 (2♀) on *Reseda alba* L. Tissemsilt: THNP 28.IV.2017 (1♂) on *Asphodelus microcarpus* Viv. leg. A. Dermane.

Flight period. From March to April, in Tissemsilt. Between February and June (Alfken 1914; Schulthess 1924; Warncke 1974; Benarfa et al. 2013; Djouama et al. 2016).

Subgenus *Melittoides* Friese, 1921

Andrena (*Melittoides*) *innesi* Gribodo, 1894

Published data. Alger (Warncke 1974), Tebessa (Benarfa et al. 2013), Biskra (Djouama et al. 2016).

New data. Tissemsilt: Cemetery 21.III.2019 (1♀) on *Reseda alba* L. Tissemsilt: THNP 5.V.2017 (1♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. From March to April, in Tissemsilt. Between March and May (Benarfa et al. 2013; Djouama et al. 2016).

Subgenus *Micrandrena* Ashmead, 1899

Andrena (*Micrandrena*) *tenuistriata* Pérez, 1895

Published data. Ain Temouchent, Tlemcen, Oran, Mascara, Alger, Ghardaia, Biskra (Warncke 1974).

New data. Tissemsilt: Cemetery 21.IV.2019 (1♂) on *Reseda alba* L. 21.III.2019 (1♀) on *Anagallis caerulea* L. Tiaret: Bouguara 16.III.2018 (2♀) on *Raphanus raphanistrum* L. leg. A. Dermane.

Flight period. From March to April (Tissemsilt, Tiaret). Mid-December, March, April and early June (Warncke 1974).

Subgenus *Nobandrena* Warncke, 1968

Andrena (*Nobandrena*) *compta* Lepeletier, 1841

Published data. Oran (Lepeletier de Saint-Fargeau 1841), Alger (Alfken 1914), Oran (Warncke 1974), Tebessa (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 5.V.2019 (2♂) on *Sinapis arvensis* L. 21.III.2019 (3♀) on *Sinapis arvensis* L. Tissemsilt: THNP 5.V.2017 (1♂) on *Sinapis arvensis* L. Tiaret: Bouguara 14.III.2018 (1♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. From March to May (Tissemsilt, Tiaret). Between March and May (Alfken 1914; Warncke 1974; Benarfa et al. 2013).

Subgenus *Notandrena* Pérez, 1890

Andrena (*Notandrena*) *fulvicornis* Schenck, 1853

Published data. Alger, 2.V.1913 (1♀); Oran, 1895 (1♂), leg. Schmiedeknecht (Wood et al. 2020).

New data. Tissemsilt: Cemetery 30.IV.2019 (3♂) on *Reseda alba* L. leg. A. Dermane.

Flight period. Observed three times, on 30 April 2019 in Tissemsilt (Cemetery). March–July (Warncke 1974, as *A. nitidiuscula nigellata* Pérez, 1895).

Andrena (*Notandrena*) *leucura* Warncke, 1974

Published data. Ghardaia (Warncke 1974).

New data. Naama: Tiout 27.III.2019 (1♀) on *Raphanus raphanistrum* L. 27.III.2019 (1♀) on *Reseda luteola* L. leg. A. Dermane.

Flight period. Observed only twice, on 27 March 2019 in Naama (Tiout). April (Warncke 1974).

Subgenus *Parandrena* Robertson, 1897
Andrena (*Parandrena*) *tunetana* Schmiedecknecht, 1900

Published data. Oran, Biskra (Warncke 1974), Biskra (Djouama et al. 2016).

New data. Tissemsilt: THNP 5.V.2017 (1♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. Captured only once on 5 May 2017 in Tissemsilt (THPN). Between April and May (Warncke 1974; Djouama et al. 2016).

Subgenus *Parandrenella* Popov, 1958
Andrena (*Parandrenella*) *tebessana* Scheuchl, Benarfa & Louadi, 2011

Published data. Tebessa (Scheuchl et al. 2011), Tebessa (Benarfa et al. 2013).

New data. Tiaret: Bouguara 14.III.2018 (2♂) on *Sinapis arvensis* L. 14.IV.2018 (2♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. From March to April, in Tiaret. Between March and June (Scheuchl et al. 2011; Benarfa et al. 2013).

Subgenus *Plastandrena* Hedicke, 1933
Andrena (*Plastandrena*) *bimaculata atrorubicata* Dours, 1872

Published data. Tlemcen, Saida, Bechar, Laghouat, Ghardaia, Touggourt, Biskra (Warncke 1974).

New data. Tissemsilt: Cemetery 22.IV.2019 (1♂) on *Reseda alba* L. 14.IV.2019 (7♀) on *Reseda alba* L. Tissemsilt: THNP 17.V.2017 (1♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. From April to May, in Tissemsilt. Early February, mid-July (Warncke 1974).

Subgenus *Poliandrena* Warncke, 1968
Andrena (*Poliandrena*) *melaleuca* Pérez, 1895

Published data. Oran, Tiaret, Theniet El Had, Alger, Constantine (Warncke 1974).

New data. Tissemsilt: Cemetery 21.IV.2019 (5♀) on *Sinapis arvensis* L. Tiaret: Bouguara 14.III.2018 (2♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. From March to April (Tissemsilt, Tiaret). Early April, mid-May (Warncke 1974).

Subgenus *Rufandrena* Warncke, 1968
Andrena (*Rufandrena*) *orbitalis* Morawitz, 1871

Published data. Oran, Djelfa (Warncke 1974).

New data. Tissemsilt: THNP 26.V.2017 (1♀) on *Paronychia argentea* L. leg. A. Dermane.

Flight period. Captured only once on 26 May 2017 in Tissemsilt (THNP). Early March, early June and early July (Warncke 1974).

Andrena (*Rufandrena*) *rufiventris* Lepeletier, 1841

Published data. Oran (Lepeletier de Saint-Fargeau 1841), Constantine (Saunders 1908), Alger, Oran, Mascara (Alfken 1914), Alger (Benoist 1961), Oran (Warncke 1974). Tebessa, Khenchela (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 14.IV.2019 (17♂) on *Reseda alba* L. 7.IV.2019 (4♀) on *Reseda alba* L. leg. A. Dermane.

Flight period. During the month of April, in Tissemsilt. Between April and June (Saunders 1908; Alfken 1914; Benoist 1961; Benarfa et al. 2013).

Subgenus *Simandrena* Pérez, 1890
Andrena (*Simandrena*) *biskrensis* Pérez, 1895

Published data. Biskra (Saunders 1908), Biskra, Ain Sefra, Ghardaia, Laghouat (Warncke 1974), Tebessa (Benarfa et al. 2013).

New data. Naama: Tiout 7.IV.2019 (1♀) on *Moricandia arvensis* L. leg. A. Dermane.

Flight period. Collected only once on 7 April 2019 in Naama (Tiout). Between February and June (Saunders 1908; Warncke 1974; Benarfa et al. 2013).

Subgenus *Suandrena* Warncke, 1968
Andrena (*Suandrena*) *cyanomicans fratella* Warncke, 1968

Published data. Khenchela, Tebessa (Benarfa et al. 2013), Biskra (Djouama et al. 2016).

New data. Naama: Tiout 17.IV.2019 (1♀) on *Brassica rapa* L. Tiaret: Bouguara 14.III.2018 (3♂) on *Raphanus raphanistrum* L. 22.III.2018 (1♂) on *Sinapis arvensis* L. 15.IV.2018 (2♀) on *Raphanus raphanistrum* L. leg. A. Dermane.

Flight period. From March to April (Tiaret, Naama). Between March and May (Benarfa et al. 2013; Djouama et al. 2016).

Andrena (*Suandrena*) *leucocyanea* Pérez, 1895

Published data. Alger (Benoist 1961), Oran, Laghouat (Warncke 1974), Tebessa (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 12.III.2019 (2♀) on *Sinapis arvensis* L. 28.IV.2019 (1♀) on *Raphanus raphanistrum* L. Tissemsilt: THNP 5.IV.2017 (1♀) on *Sinapis arvensis* L. Tiaret: Bouguara 14.III.2018 (1♀) on *Sinapis arvensis* L. Leg. A. Dermane.

Flight period. From March to April, in Tissemsilt. Between January and April (Benoist 1961; Warncke 1974; Benarfa et al. 2013).

Andrena (*Suandrena*) *savignyi* Spinola, 1838

Published data. Biskra (Saunders 1908; Schulthess 1924), Biskra, Ghardaia, Aïn Sefra (Warncke 1974), Tebessa (Benarfa et al. 2013), Biskra (Djouama et al. 2016).

New data. Naama: Tiout 19.III.2019 (4♀) on *Moricandia arvensis* L. Tiaret: Bouguara 14.III.2018 (2♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. During the month of March (Tiaret, Naama). Between January and March (Saunders 1908; Warncke 1974; Benarfa et al. 2013), February, March, November, and December (Djouama et al. 2016).

Subgenus *Taeniandrena* Hedicke, 1933

Andrena (*Taeniandrena*) *poupillieri* Dours, 1872

Published data. Constantine, Alger (Saunders 1908), Annaba, Oran (Warncke 1974), Tebessa, Khenchela (Benarfa et al. 2013).

New data. Tissemsilt: THNP 19.IV.2017 (2♀) on *Centaurea calcitrapa* L. 9.V.2017 (3♀) on *Asphodelus microcarpus* Viv. leg. A. Dermane.

Flight period. During the month of April, in Tissemsilt. Between March and July (Saunders 1908; Warncke 1974; Benarfa et al. 2013).

Subgenus *Thysandrena* Lanham, 1949

Andrena (*Thysandrena*) *numida* Lepeletier, 1841

Published data. Oran (Lepeletier de Saint-Fargeau 1841), Biskra (Saunders 1908), Oran (Benoist 1969), Tlemcen, Oran, Mascara, Ghardaia, Biskra (Warncke 1974), Tebessa, Biskra (Benarfa et al. 2013), Biskra (Djouama et al. 2016).

New data. Tiaret: Bouguara 14.III.2018 (2♂) on *Sinapis arvensis* L. 15.IV.2018 (1♂) on *Anethum graveolens* L. 5.IV.2018 (2♀) on *Anethum graveolens* L. leg. A. Dermane.

Flight period. From March to April, in Tiaret. Between March and June (Saunders 1908; Warncke 1974; Benarfa et al. 2013; Djouama et al. 2016).

Andrena (*Truncandrena*) *ferrugineicrus* Dours, 1872

Published data. Biskra (Saunders 1908), Alger, Mascara, Oran (Alfken 1914), Oran, Biskra, Laghouat (Warncke 1974) Tebessa, Khenchela (Benarfa et al. 2013), Biskra (Djouama et al. 2016).

New data. Tissemsilt: Cemetery 14.III.2019 (4♂) on *Reseda alba* L. 28.III.2019 (5♂) on *Sinapis arvensis* L. 21.VI.2019 (2♂) on *Reseda alba* L. 5.V.2019 (2♂) on *Sinapis arvensis* L. 14.VI.2019 (8♀) on *Sinapis arvensis* L. 14.VI.2019 (1♀) on *Reseda alba* L. 21.VI.2019 (1♀) on *Echium vulgare* L. 5.V.2019 (2♀) on *Sinapis arvensis* L. Tissemsilt: THNP 21.VI.2017 (2♀) on *Sinapis arvensis* L. Tiaret: Bouguara 21.III.2018 (7♂) on *Sinapis arvensis* L. 7.IV.2018 (1♂) on *Raphanus raphanistrum* L. 9.III.2018 (2♀) on *Raphanus raphanistrum* L. 14.III.2018 (2♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. From March to May (Tissemsilt, Tiaret). Between February and May (Saunders 1908; Alfken 1914; Warncke 1974; Benarfa et al. 2013; Djouama et al. 2016).

Andrena (*Truncandrena*) *medeninensis* Pérez, 1895

Published data. Laghouat, Ghardaia, Biskra (Warncke 1974), Tebessa (Benarfa et al. 2013).

New data. Naama: Tiout 5.IV.2019 (4♀) on *Brassica rapa* L. leg. A. Dermane.

Flight period. During the month of April, in Naama. Between March and August (Warncke 1974), January (Benarfa et al. 2013).

Andrena (*Truncandrena*) *minapalumboi* Gribodo, 1894

Published data. Annaba (Saunders 1908), Alger, Mascara (Alfken 1914), Tlemcen (Warncke 1974), Tebessa (Benarfa et al. 2013).

New data. Tissemsilt: THNP 21.IV.2017 (10♀) on *Sinapis arvensis* L. 5.V.2017 (15♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. From April to May, in Tissemsilt. Between March and May (Saunders 1908; Alfken 1914; Warncke 1974; Benarfa et al. 2013).

Andrena (*Truncandrena*) *varia* Pérez, 1895

Published data. Oran (Warncke 1974).

New data. Tiaret: Bouguara 5.III.2018 (5♂) on *Sinapis arvensis* L. 7.IV.2018 (1♂) on *Raphanus raphanistrum* L. 7.IV.2018 (7♂) on *Sinapis arvensis* L. 15.IV.2018 (1♀) on *Sinapis arvensis* L. 15.IV.2018 (2♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. From March to April, in Tiaret. Mid-January, late February and early May (Warncke 1974).

Subgenus *Zonandrena* Hedicke, 1933
Andrena (*Zonandrena*) *flavipes* Panzer, 1799

Published data. Constantine, Annaba (Saunders 1908), Alger (Alfken 1914), Tlemcen (Schulthess 1924), Alger (Benoist 1961), several locations (Warncke 1974), Tizi Ouzou (Aouar-Sadli 2009), Guelma, Tebessa, Khenchela, Constantine, Oum El Bouaghi, Mila, Souk Ahras and Batna (Benarfa et al. 2013), Biskra (Djouama et al. 2016).

New data. Tissemsilt: Cemetery 14.III.2019 (18♂) on *Reseda alba* L. 7.IV.2019 (22♂) on *Reseda alba* L. 7.IV.2019 (1♂) on *Raphanus raphanistrum* L. 7.IV.2019 (1♂) on *Urospermum picroides* L. 14.IV.2019 (26♂) on *Reseda alba* L. 14.IV.2019 (1♂) on *Echium vulgare* L. 14.IV.2019 (1♂) on *Sinapis arvensis* L. 28.IV.2019 (1♂) *Raphanus raphanistrum* L. 28.IV.2019 (1♂) *Anacyclus clavatus* (Desf) Pers. 7.IV.2019 (20♀) on *Reseda alba* L. 14.IV.2019 (8♀) on *Sinapis arvensis* L. 17.III.2019 (17♀) on *Anacyclus clavatus* (Desf) Pers. Tissemsilt: THNP 28.IV.2017 (1♂) on *Carduus tenuiflorus* Curtis. 19.V.2017 (6♀) on *Retama raetam* L. 19.V.2017 (4♀) on *Asphodelus microcarpus* Viv. 2.VI.2017 (4♀) on *Anacyclus clavatus* (Desf) Pers. 5.V.2017 (1♀) on *Echium vulgare* L. 12.V.2017 (1♀) on *Sinapis arvensis* L. Naama: Tiout 4.V.2019 (4♀) on *Anethum graveolens* L. Tiaret: Bouguara 22.IV.2018 (1♂) on *Anethum graveolens* L. 5.V.2018 (9♂) on *Reseda alba* L. 14.III.2018 (15♀) on *Raphanus raphanistrum* L. 14.III.2019 (1♀) on *Hedysarum spinosissimum* L. 30.IV.2018 (42♀) on *Raphanus raphanistrum* L. 30.IV.2018 (5♀) on *Reseda alba* L. 30.IV.2018 (1♀) on *Hedysarum spinosissimum* L. 1.V.2018 (9♀) on *Reseda alba* L. 28.V.2018 (17♀) on *Anethum graveolens* L. leg. A. Dermane.

Flight period. From March to May (Tissemsilt, Tiaret and Naama). Between January and June (Saunders 1908; Alfken 1914; Schulthess 1924; Benoist 1961; Warncke 1974; Benarfa et al. 2013; Djouama et al. 2016).

Andrena (*Zonandrena*) *vulcana* Dours, 1873

Published data. Alger (Alfken 1914), Alger, Setif, Constantine (Warncke 1974), Tebessa (Benarfa et al. 2013).

New data. Tissemsilt: Cemetery 21.IV.2019 (1♀) on *Sinapis arvensis* L. leg. A. Dermane.

Flight period. Captured only once on 21 April 2019 in Tissemsilt (Cemetery). Between April and May (Alfken 1914; Warncke 1974; Benarfa et al. 2013).

Discussion

This list of the genus *Andrena* from Western Algeria provides information on the species reported in three regions during the period 2017–2019, based on original collections. The list contains 56 species from 30 subgenera and includes a new species for the fauna of Algeria, *Andrena hystrix* Schmiedeknecht, 1883. This species is distributed through south-western Europe as well as Turkey, Southern Ukraine and Morocco (Gusenleitner & Schwarz 2002). In Western Algeria, no sampling has targeted the genus *Andrena* since the work of Warncke (1974), and therefore the discovery of an overlooked species was not unexpected.

This work has also continued to improve our understanding of the distributions and taxonomic statuses of North African *Andrena*. It has revealed the presence of a species recently described from north-eastern Algeria in Western Algeria, *Andrena tebessana*, more precisely from the locality of Tiaret. It was also recently discovered in Morocco (Wood et al. 2020), so its presence in Western Algeria fills this distributional gap. Moreover, *Andrena fulvicornis* is nominally recorded as new for the Algerian fauna, but this is because of nomenclatural problems. Warncke (1967) considered *A. fulvicornis* to be a junior synonym of *A. nitidiuscula* Schenck, 1854, and listed material from North Africa under the combination *A. nitidiuscula nigellata* Pérez, 1895 (Gusenleitner & Schwarz 2002). However, to date, all examined material from North Africa has conformed to *A. fulvicornis* (Wood et al. 2020), including in the present work.

It is interesting to note that the following species, *A. verticalis* Pérez, 1895, *A. deserta* Warncke, 1974, *A. nigroviridula* Dours, 1873, *A. reperta* Warncke, 1974, *A. boyerella* Dours, 1872, *A. microcardia* Pérez, 1895, *A. mariana solda* Warncke, 1974, *A. djelfensis* Pérez, 1895, *A. pandosa* Warncke, 1968, *A. totana* Warncke, 1974, *A. leptopyga* Pérez, 1896, *A. limata* Smith, 1853,

A. tenuistriata Pérez, 1895, *A. fulvicornis* Schenck, 1853, *A. leucura* Warncke, 1974, *A. melaleuca* Pérez, 1895, *A. orbitalis* Morawitz, 1871, and *A. varia* Pérez, 1895 have not been cited in the most recent work by authors working in the east and centre of the country (Louadi & Doumandji 1998a, 1998b; Louadi et al. 2008; Aouar-Sadli et al. 2012; Bendifallah et al. 2012, 2013; Benarfa et al. 2013; Djouama et al. 2016; Maghni et al. 2017; Bendifallah & Ortiz-Sánchez 2018; Chichoune et al. 2018; Bouti et al. 2020). Species lists remain incomplete because collection areas have been limited to a few localities in Algeria.

The majority of *Andrena* species fly in spring, coinciding on the one hand with relatively mild conditions and on the other hand with the period of greatest flowering plant diversity (Bendifallah et al. 2010). According to the list of *Andrena* inventoried from Western Algeria, 129 specimens were recorded during the month of March and 464 specimens in April. These results confirm those of Benarfa et al. (2013) in north-eastern Algeria and thus of Djouama et al. (2016) in a few Saharan localities in Eastern Algeria where they find that the majority of *Andrena* specimens fly in April.

The floral choices of the *Andrena* species studied here are concentrated primarily on three botanical families: Asteraceae, Brassicaceae and Resedaceae. Moreover, Benarfa et al. (2013) note that Brassicaceae, Lamiaceae and Resedaceae attract a large number of species. On the other hand, Djouama et al. (2016) note only two botanical families, Asteraceae and Brassicaceae. From this, we can see that the floral choices of the genus *Andrena* differ according to the region of study (biotope) and according to the availability of floral resources (botanical families). Therefore, the diversity and abundance of bees varies in relation to natural variations in the habitat (Hoehn et al. 2008).

Analysis of pollen loads provided an initial description of the diet of 19 species of *Andrena* from Western Algeria. Twelve species (63.3%) were classified as pollen specialists, collecting pollen from a single botanical family. The remaining seven species (36.6%) were classified as pollen generalists, collecting pollen from many botanical families. The terms "possibly, probably" were used because this is the first study carried out in Algeria, and it is also a first step in the study of the diet of several of these species with samples drawn from a restricted number of sampling locations. Five oligolectic species collected 100% pure Asteraceae pollen: *A. boyerella*, *A. hesperia*, *A. isis*, *A. microcardia* and *A. rhyssonota*. All these species are univoltine and their shorter flight season and the resulting competition for limited time resources may favour an all-or-nothing investment in the physiological ability to process pollen from Asteraceae (Wood & Roberts 2018). These species were caught in arid environments, and indeed, xeric locations with short flowering seasons tend to have bees with a greater degree of pollen specialisation (Minckley & Roulston 2006). Four of the five species are also part of the subgenus *Chlorandrena* well known to be strongly associated with Asteraceae, and so these results are to be expected (Schwenninger 2015).

Andrena sardoa collected 100% pure *Asphodelus* (Asphodelaceae) pollen. This is in line with the observations of Lepeletier de Saint-Fargeau (1841) in the Western Mediterranean, later confirmed by Westrich (2008) who analysed pollen loads of 17 specimens from 16 localities, from Italy, France, Spain, Portugal and Algeria. All loads contained only pollen of *Asphodelus*, proving that *Andrena sardoa* is oligolectic on *Asphodelus*, and also that it is the first and so far, only species of *Andrena* to be exclusively associated with this genus.

It is important to note that in the present study, we found six species of *Andrena* that appeared to show polylectic tendencies and collected a substantial proportion of their pollen from Brassicaceae, these species being *A. ferrugineicrus* (81.3%), *A. fuscosa* (75.9%), *A. morio* (62.5%), *A. agilissima* (58.2%), *A. flavipes* (57.9%) and *A. melaleuca* (35%), and a further species *A. limata* also collected small amounts of pollen from Brassicaceae. Whilst species such as *A. flavipes* and *A. morio* are well known to be polylectic, others are known to be oligolectic in the Central European part of their range, such as *A. agilissima* (Westrich 1989). There is taxonomic complexity in Mediterranean *A.* (*Agandrena*), with several described subspecies (Gusenleitner & Schwarz 2002) which to date have not been satisfactorily resolved. Other species have only a very limited number of pollen loads analysed, and consequently, these results should be interpreted with caution until more data are available.

Regarding their conservation, as specialised bees are less flexible in their food choices, the resulting loss of floristic diversity is probably the main factor behind the decline of their range over the last century (Ollerton et al. 2014; Scheper et al. 2014). However, a more thorough understanding of the pollen preferences of *Andrena* species, whether generalists or specialists, will require a great deal of work in order to have a complete knowledge of this genus in North Africa and particularly Algeria.

Acknowledgements

Our thanks to Pierre Rasmont (UMONS-Belgium) for providing laboratory support and facilities. We would also like to thank the other members of the laboratory, and more particularly Dimitri Evrard, Mira Boustani, Guillaume Ghisbain and Maryse Vanderplanck (UMONS-Belgium) for their help in making this study possible. This work was partly supported by the 'Fonds de la Recherche Scientifique – FNRS', the Research Foundation-Flanders (FWO) under EOS Project named CLIPS (n°3094785) and the Directorate-General for scientific research and technological development (Algeria). We also thank two anonymous reviewers whose comments greatly improved the manuscript.

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