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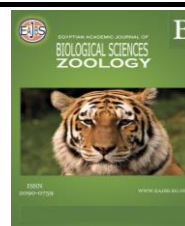
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Taxonomic Revision of Genus *Coelioxys* (Hymenoptera: Megachilidae) of Egypt

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ABSTRACT

Genus *Coelioxys* Latreille, 1809 in Egypt is reviewed. Nine species and one subspecies were previously recorded from Egypt, *C. afra*, *C. conoidea*, *C. echinatus*, *C. elegantula*, *C. erythrurus*, *C. haemorrhoea*, *C. haemorrhoea rhodacantha*, *C. obtusus*, *C. rufispina* and *C. decipiense*. The species are described, illustrated and a key to the species occurring in Egypt is provided and a faunistic list is given.

INTRODUCTION

The first attempt for revising genus *Coelioxys* in Egypt was carried out by Alfken (1934) who keyed 10 species. This key included *C. gymnopygia* Spin., 1838, which, later, synonymized into *C. rufiventris* and transmitted into genus *Radsowskina*. Also some species synonymized into other species (are mentioned in this study). Another study was carried out by Warncke (1992) who revised 29 Palearctic species, including the Egyptian species. Salem and El Azab (2017) presented the most recent study on the Egyptian species of family Megachilidae, and already contains *coelioxys* species, the study includes old names of species and required updating.

Members of this genus are characterized by the following: Abdomen of female narrow apically, usually pointed (Fig.9); scopa absent; axillae with long spine (Fig.8). In males, posterior margin of T6 with distinct long spines of six to nine spines (Fig.4); some species of each sex having hairs on the eyes (Fig.7).

Coelioxys species are cleptoparasitic bees on *Megachile*, Anthidiini and Osmiini. Females use its long and pointed abdomen for penetrating the nest of host by its ovipositor and, put the egg in the collected food (Michener, 2007). *Coelioxys* occurs in all continents except Australia (Michener, 2007). In Egypt, *Coelioxys* is represented by 9 species and 1 subspecies. An illustrated key for identifying the Egyptian species, a faunistic list and a distribution map are also given.

MATERIALS AND METHODS

The present study is based on specimens, which collected between 2015 to 2019 by using the sweeping net from different localities (Table 1 & Map 1) and the specimens from Egyptian

repositories

Specimens were pinned, and deposited in the Zoology department, faculty of science (boys), Al Azhar University, Cairo, Egypt. Morphological terms follow (Michener 2007). Body sculpture terminology follows (Harris, 1979). Measurements, description, and drawings were made with the help of square and micrometer eyepieces. Further image processing was done using the software Adobe Photoshop (v. 7.0 ME). The map obtained from WIKIMEDIA COMMONS in raster format was then referenced and the localities determined by ArcGIS 9.3.1.

The following Repositories (Insect collections) were searched for specimens belong to the target genus:

ASUA: Entomological Collection of Faculty of Science, Ain Shams University.

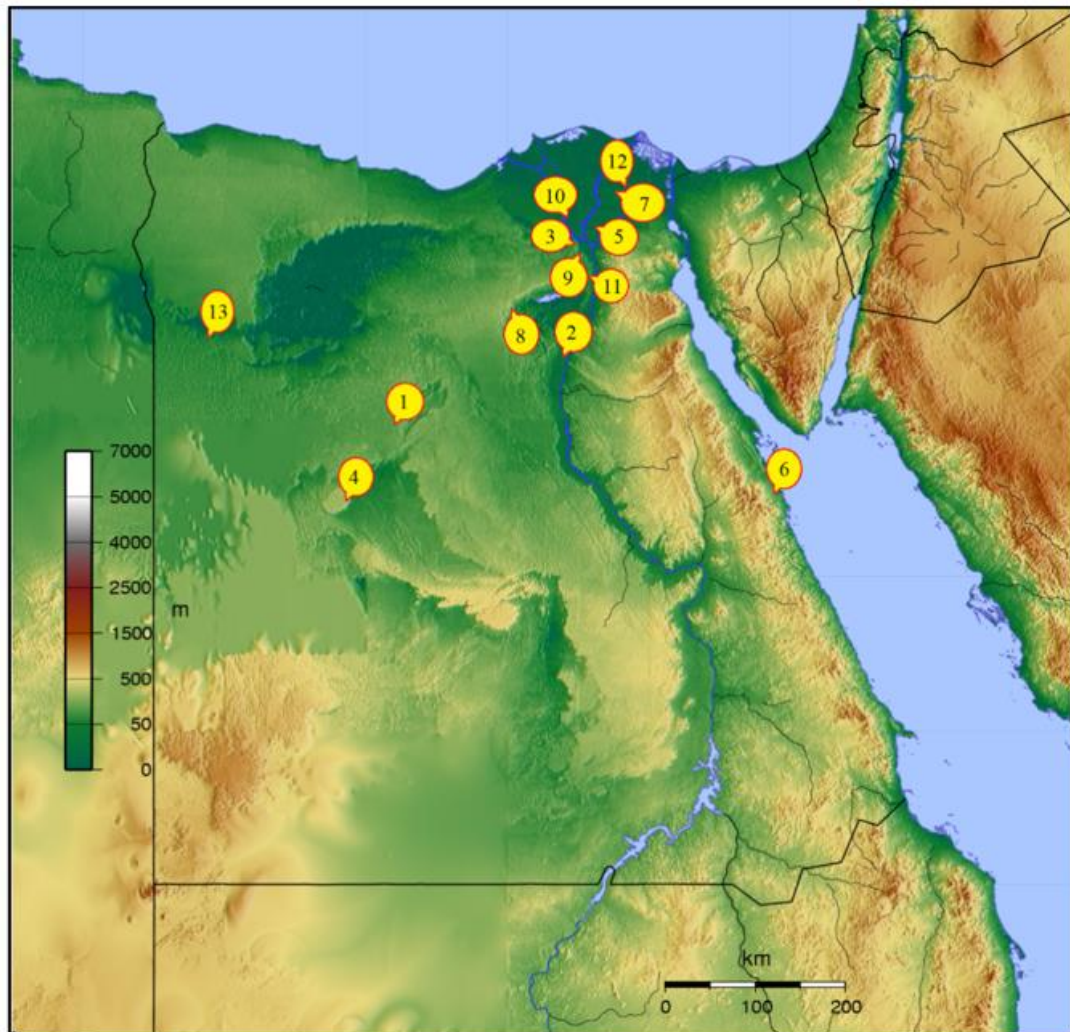
CUE: Entomological Collection of Faculty of Science, Cairo University. Efflatoun Bey Collection, Entomology Department.

PPDD—Ministry of Agriculture collection, Plant Protection Institute, Giza, Egypt.

Abbreviations. F1, F2, F3, etc. = first, second, third, etc. antennal flagellomeres; IOD = interocellar distance; OOD = ocellocular distance; SMC1= first submarginal cell; SMC2= second submarginal cell; T1, T2, T3, etc. = first, second, third, etc. abdominal terga; S1, S2, S3, etc. = first, second, third, etc. abdominal sterna.

Table 1. Collecting sites and dates of collecting

Species	Country	Lat/longs	Date
<i>Coelioxys afra</i> Lepeletier, 1841	Barkash (Giza)	30°09'50"N; 31°01'29"E	04.VIII.1953
	Kom Oshim (Fayoum)	29°34'00"N; 30°55'00"E	5.VI.1952
<i>Coelioxys elegantula</i> Alfken, 1934	Kom Oshim(Fayoum)	29°34'00"N; 30°55'00"E	4.IX.1953
<i>Coelioxys haemorrhoea</i> Förster, 1853	Bahnasia (Beni Sewaif)	29°04'59"N; 31°05'47"E	13.VIII.2016
	Farafra O.(New Vally)	27° 3'24.25"N; 27°58'13.07"E	03. IX.2018
	Kom Oshim(Fayoum)	29°34'00"N; 30°55'00"E	08.X.2015
	Siwa O.(Marsa Matrouh)	29°12'11"N; 29°12'11"E	11.IX.2015
	Baharia O. (Giza)	28°23'06"N; 28°54'27"E	26- 28.IX.2013
	Salhya (Sharkia)	30°39'17.01"N; 31°52'24.02"E	12.VIII.2016
<i>Coelioxys haemorrhoea rhodacantha</i> Cockerell, 1931	Gabal asfar (Qalyoubia)	30°11'29"N; 31°23'55"E	30.V.1956
	Mansouriah(Giza)	30°08'10"N; 31°04'25"E	23.IV.1954
<i>Coelioxys obtusus</i> Pérez, 1884	Harghada (Red sea)	27°15'28.42"N; 33°48'41.78"E	20.IV. 2019
<i>Coelioxys rufispina</i> Walker, 1871	Pyramid (Giza)	29°58'38"N; 31° 08'13"E	9.VII. 1953
	Gabal asfar (Cairo),	30°11'29"N; 31°23'55"E	8.VII.1953
	Kom Oshim(Fayoum)	29°34'00"N; 30°55'00"E	01. VIII.1953
	Mansouria(Giza)	30°08'10"N; 31°04'25"E	12.VII.1953
<i>Coelioxys decipiens</i> Spinola, 1838	Monsa (Monofya)	30°21'41"N; 30°55'26"E	5.V. 2016
	K.Hamam (Sharkia)	30°36'42.60"N; 31°30'39.99"E	07.IV.2016



Map 1: Collecting localities

Egyptian localities for *Coelioxys* specimens: 1, Baharia Oasis (Giza); 2, Bahnsia (BeniSewaif); 3, Barkash (Giza); 4, Farafra Oasis (New Valley); 5, Gabalasar(Qalyoubia); 6, Hurghada (Red Sea); 7, Kafer Hamam (Sharkia); 8, KomOshim (Fayoum); 9, Mansouriah (Giza); 10, Monsa (Monufya); 11, Pyramid (Giza); 12, Salhya (Sharkia); 13, Siwa Oasis (M. Matrouh).

RESULTS

Coelioxys Latreille, 1809 in Egypt, has two subgenera *Liothyrapis*, which represented by one species *C. decipiens* and remain species belong subgenus *Allocoelioxys*.

Key to subgenera of *Coelioxys* Latreille, 1809

1. Eyes without hairs (Fig.13); bandages of the abdomen with normal hairs [*C. decipiens* Spin.]*C. (Liothyrapis)*
- Eyes hairy (Fig.7); bandages of the abdomen with squamous hairs.....*C. (Allocoelioxys)*

Key to the female's species of subgenus *C. Allocoelioxys*

(After modification of Alfken, 1934 and Warnke, 1992)

1. Fore coxa with a wide triangular tooth(Fig.14); body with normal hair; Last sternum un serrated laterally, usually much wider than the last tergum; last sternum evenly narrowed; clypeus hairs the same length; metasomal terga and sterna with lateral large triangular bandages; clypeus

- with short hair; mandible normal; outer spur of the hind legs blunt. *C. conoidea*
- Fore coxa rounded from upper margin(Fig.6); body with squamous hair.....2
2. Body at least 11 mm 3
- Body at most 9 mm 5
3. T6 shiny, very coarsely wrinkled, with an only longitudinal keel in the middle (Fig.37), laterally with wide fringe; metasomal color varies, usually only T6, rarely the entire metasoma red; scales bandages narrow, two-row, scale the same length. The two last tergum about the same width towards the rear, the last tergum with broader margin, with hairy tightly; mesonotum coarsely wrinkled punctate, because of the points not covered with scales; 11-12 mm. *C. obtusus*
- T6 dull, with dense and fine punctures, with 3 longitudinal carina, one central and 2 lateral, laterally with narrow fringe.....4
4. Mesoscutum midially with scattered strong punctures, distance inbetween more than punctures wide, interspaces densely granular and dull; last tergum red, apical half laterally with double bar *C. erythrurus*
- Mesoscutum coarse, interspaces narrow, shiny; last tergum laterally with simply limited margin; antennae and legs dark; last tergum bare; mesopleuron with sparsely long hair..... *C. echinata*
5. Mesoscutum basally with white hairs; T6 medially, subapically with sharp carina 6
- Mesoscutum basally without white hairs; T6 medially, subapically without carina or indistinct 8
6. Mesoscutum and scutellum coarsely wrinkled punctate, the latter covered with white scaly hairs; T6 with rounded posterior margin..... 7
- Mesoscutum with fine and weak wrinkled punctate, with a fine median groove; scutellm with dense and fine punctate, densely covered with white scales; T6 medially with longitudinal median carina(Fig.24), basally with very fine and scattered punctured, front tip strongly emarginate, at the end in the middle of a very small, sharp, triangular cut; 1st, 2nd and 6th terga red; antenna almost black, red distally, wings light yellow brown. 8 mm.... *C. elegantula*
7. Antennae black, flagellum beneath more or less red; lateral spines of scutellum black or black-brown; abdomen black except for T6 red; 7 mm. *C. haemorrhoea*.
- Antenna black basally and red distally; wing yellow-brown; lateral spines of scutellum red; abdominal color varies: T1 and T6, sometimes T2, T3-5th laterally and abdomen completely or mostly red; 7-7.5 mm. *C. haemorrhoea rhodacantha*.
8. Posterior margin of T6 truncated or rounded or very weak indented; antennae more or less red, wing more or less reddish-brown; T1 black, with equally punctuate; T2-T5 such as in *C. afra* Lep; posterior margin of T6 rounded or truncated; wing venation red-brown; 6.5-7 mm..... *C. rufispina*.
- Posterior margin of S6 deeply rounded cut(Fig.16); antennae black, flagellum beneath little brighter; T1 equally fine punctured, T2-T5 with scattered fine punctures in the middle; 7-9 mm..... *C. afra*.

Key to the male's species of sub genus *C. Allocoelioxys*

(After modification of Alfken, 1934 and Warnke, 1992)

1. Abdominal terga with normal hair, sterna bare; Vertex not more than 3 ocellus wide; Posterior margin of S4 hairless and distinctly sinuate, limited angular notch like teeth; abdominal terga and sterna laterally with wide hair spots; the outer spur of the hind legs dark, thick with short almost perpendicularly bent over ti, T6 with blunt teeth (fig.4).....*C. conoidea*
- Abdominal terga segments with squamous hair; Posterior margin of S4 continuously(shallow cut in *afra*), or the posterior margin under denser pubescence not visible..... 2
2. Large species 9.5-12 mm; The 4 upper teeth of T6 more or less grown; T7 extended posteriorly

- and split at the top.....3
- Smaller species 6.5-9 mm; T6 with 8, rarely 9 of freestanding teeth; T7 broad, deep rounded emarginate, ending in 2 sharp teeth, not extended posteriorly..... 4
3. T6 broad, black with a yellow-red short, blunt posterior teeth(Fig.36); The 4 upper spines fused to a plate; this has a sharply margined middle tubercle, laterally adjacent this a single longitudinal groove of deep punctures. whose sharp edges are blunt tuberculated rear and behind the pits have a fine, sharp keel; T7 with the opera grown laterally dented weak and low split at the top. 10 mm.....*C. obtusus*
- T6 broad, red with a long, pointed red lateral teeth; The exterior ones of 4 upper spines are higher than the inner, which have grown to a pitted recessed flash at the end of edged board; lower part of T7 long, deep on the ventral side as pointed teeth projecting; 9.5-12 mm.....*C. erythrurus*
4. T6 basally with white hairs; lateral spines pointed and bent downwards, antennae more or less red 5
- T6 with a continuous, fringe at the base, usually black in color. lateral spines expanded flat, dull. antenna black.....6
5. Posterior margin of S4 with shallow cut medially, slightly deeper pitch; T2 without lateral cross beam; T2 with a tuft of hair from the circular depression; mesoscutum grow big checkered with soft intervals; T6 with 8 teeth (Fig.18)*C. afra*
- Posterior margin of S4 shallow dropped and straight; T2 with Lateral cross beam; T2 without tufts ; Last tergum normal, baso-medially with arched longitudinal carina; T2 with lateral groove, posteriorly with roughly punctured without haired pitch*C. echinata*
6. Adominal terga with equally strong and densely punctate; genal spot large, long-rounded..... 7
- Abdominal terga with unequally strong and densely punctate, very scattered with smooth locations in the middle; apical half or almost the entire plate colored red; genal spot small, rounded; 6.5-8 mm.....*C. haemorrhoea rhodacantha*
7. Lateral spines of T6 small, pointed, straight or slightly curved laterally(Fig.31); usually between the lower spines tooth in the middle, so 9 spines are present; 7-8 mm..... *C. haemorrhoea*.
- Lateral spines of T6 angulate; T6 more or less red, at least the spines, posterior margin of T6 with 8 spines; 7-7.5 mm..... *C. rufispin*

Coelioxys afra Lepeletier, 1841

Coelioxys afra Lepeletier 1841. p.525-526, Lectotypus.

Coelioxys coronata Förster 1853. p.280-282.

Coelioxys mandibularis Chevrier 1872, p.487-489.

Female Description:

(after alfken, 1934, Warncke, 1992& Nadimi, *et al.*, 2013)

Length: 7-9 mm

Colour: Body including antenna black; flagellum beneath lighter; T1 and last abdominal segment brownish-red.

Pupbscence: Body with squamous hairs; eyes hairy; mesoscutum basally without spots of squamous hairs; T1-5 with bandages of squamous hairs.

Head: Clypeus finely ruguloso-punctate; antennofrons and frons with a longitudinal mid-carina; vertex with rough punctures; F2 at most 1.5 X longer than wide; the following segment sub-square.

Thorax: Mesoscutum with rough punctures; fore coxa rounded without a spine.

Abdomen: T1 equally fine punctured, 2nd-5th terga with Scattered fine punctures in the center; T2 and T3 without transverse groove; basale half of T4-5 with finely punctures; T6 medially,

subapically without carina; apical part of T6 and S6 broad and short, moderately narrowed, with a rounded emargination apically (Fig. 16)

Male Description:

Body Length: 9.5 mm; fore wing 6 mm

Color: Head and thorax black; antenna, mandible, tegula, legs and abdomen red (Fig. 19).

Pubescence: Face and gena clothed with short and dense recumbent white hairs; vertex with sparse scaly hairs (Fig. 20); mesoscutum with sparse scaly hairs; mesopleuron with dense scaly hairs; tibial spure yellow; propodeum with long white hairs; posterior margin of the abdominal segment with a fringe of dense scaly hairs (Fig. 18), large laterally; abdominal sterna clothed with scaly hairs interrupted medially; T1 with a longitudinal fringe of scaly hairs.

Head: in dorsal view as long as broad and 1.14 X wider than pronotum; vertex and gena coarse densely punctate (Fig. 20); genal fossa oval and carinated basally; malar space neglected; eyes hairy, ocellular distance (OOD) as long as (IOD); mandible with dull three teeth; F1 narrow basally, scarcely longer than F2; F2–F10 as long as wide; F11 1.2 X longer than broad.

Thorax: Pronotum hardly visible from dorsal view; scutum and scutellum coarse densely punctate; posterior margin of scutellum toothed; pronotum and anterior face of mesopleuron carinate fore wing with marginal cell 4.3 X longer than broad; SMC1 1.1 X longer than SMC2; basal vein roughly convex and meeting vein Cu at an acute angle; 2nd m-cu meeting SMC2 sub apically; marginal cell distal to stigma on costa, 2.5 X shorter than stigma; stigma 3 X longer than broad (Fig. 21).

Abdomen: Slightly convex, 1.15 X longer than broad; T1 with transverse carina, the anterior surface concave; T2 and T3 with basal transverse groove, a lateral groove in T2 with small hairs (Fig. 18); T4 and T5 with apical groove; T5 toothed laterally; disk of T6 grooved medially, with 7 teeth (2 laterals three above and two beneath, below teeth protruded and long as v shape); T7 prolonged with a long spine ; posterior margin of S4 truncate (Fig. 22).

Material Examined: 1♂, Kom Oshim (Fayoum), 04.VIII .1953, coll. Ali; 1♂ Barkash (Giza) , 5.VI.1952, coll. Ali. [ASUA]

Extralimital Distribution: Morocco, Tunesia, Turkmenistan, Usbekistan, Turkey and Palestine (Warncke 1992)

***Coelioxys conoidea* Illiger 1806**

Anthophora conoidea Illiger 1806. p. 105-106.

Coelioxys aegyptiaca Radoszkowski 1876. p.118.

Coelioxys punctata Lepeletier 1841. p.520.

Female Description: (after Warncke, 1992)

Pubescence: Body with normal hair ; Body entirely (or mostly) with normal hairs; clypeus with short white hair; metasomal terga and sterna with lateral and large triangular bandages, interrupted medially

Thorax: Fore coxa with the wide triangular tooth; outer spur of the hind legs blunt.

Abdomen: T4 and T5 sparsely punctate apically; T6 smaller than S6, densely punctate, with longitudinal median smooth stripe (Fig. 3).

Male Description:

Pubescence: Abdominal terga with normal hair, sterna bare; abdominal segment laterally with wide hair bandages, interrupted medially.

Head: Vertex not more than 3 X ocellus wide

Thorax: Fore coxa with the long, triangular tooth ; the outer spur of the hind legs dark, thick with short almost perpendicularly bent over tip

Abdomen: T2-T4 densely punctate laterally and basally, sparsely punctate medially; last tergum with 6 spines (Fig. 4); Posterior margin of S4 hairless and distinctly sinuate, angular notch like teeth.

Extralimital Distribution: North Africa, Europe, Algeria and Turkey (Warncke 1992).

***Coelioxys echinatus* Förster, 1853**

Coelioxys octodentata Lepeletier 1841, p. 524-525

Coelioxys rufocaudata Smith 1854, p. 260

Coelioxys echinata Förster 1853, p. 279-280

Description: Female (after Warncke, 1992)

Colour: Antenna and legs dark; apical half of last segment red.

Pubescence: Body with squamous hair; mesopleuron with sparsely long hair; tergal bandages long and dense; last tergum bare.

Thorax: Mesoscutum coarsely punctate, interspaces narrow, shiny.

Abdomen: T5 with densely punctate basally and sparsely punctate apically; T6 extended and pointed apically, basolaterally weak rounded with sparsely punctate (Figs. 1&2); S6 pointed apically, slightly narrower than T6

Male Description:

Head: The shiny genal fossa at the front edge at most slightly carinated; F2 less than 1.5 times as long as wide; vertex at most 2 X ocellus wide

Thorax: Fore coxa rounded

Abdomen: T2 with lateral groove, posteriorly with roughly punctured without haired pitch; T3 at most with indicated transverse groove; posterior margin of S4 shallow dropped and straight; last tergum normal, baso-medially with arched longitudinal carina; last tergum with 8 spines (Fig. 2); the reduced T7 does not extend out from behind the last tergum, in the middle at the most square; S4 slightly truncated.

Extralimital Distribution: Morocco, Algeria, Turkey (Warncke, 1992).

***Coelioxys elegantula* Alfken, 1934**

Coelioxys elegantula Alfken, 1934, p.180.

Female Description:

Body Length: 9 mm; fore wing: 6 mm.

Color: Body including mandible and leg red; head, mesoscutum, and propodeum black (Fig. 1); T2-4 with blackish tint medially; wings membranous.

Pubescence: Face with clypeus clothed with dense and short white hairs; gena and basal part of mandible clothed with dense and recumbent white hairs; vertex and mesoscutum with sparse of scaly hairs; mesopleuron laterally with long white hairs; legs dorsally clothed with short scaly hairs (Fig. 24); abdominal terga apical fringe of dense and white scaly hairs; abdominal sterna with an apical fringe of dense scaly hairs, interrupted medially; S1 with median fringe of scaly hairs.

Head: In dorsal view 1.62 X slightly broader than long and 1.3 X wider than pronotum; vertex densely punctate; clypeus slightly convex medially, apical margin truncate with four small spines; ocellular distance (OOD) 1.1 x slightly longer than interocellar distance (IOD); eyes bare; malar space neglected; mandible cylinder with acute three teeth; F1 narrower basally, as long as F2; F2-F10 1.2 X longer than broad.

Thorax: Pronotum hardly visible from dorsal view; scutum and scutellum coarse densely punctate; posterior margin of scutellum toothed; mesoscutum with longitudinal median carina; scutellum flat; pronotum and anterior face of mesopleuron carinate; fore wing with marginal cell 4 X longer than broad; SMC1 1.1 X longer than SMC2; basal vein roughly convex and meeting vein Cu at acute angle; 2nd m-cu meeting SMC2 sub apically; marginal cell distal to stigma on costa, 3 X shorter than stigma (Fig. 25); stigma 3 X longer than broad; fore coxa with a cute small tooth.

Abdomen: Convex from dorsal view with longitudinal and tapering end, 1.6 X longer than broad; T1- T4 sparsely punctate, punctures large; T5-T6 densely punctate, punctures small than other; T1-T2 with depressed median groove; T6 depressed laterally with longitudinal median carina (Fig. 23); S6 longer than T6.

Male Description: (after Warncke, 1992)

Head: Vertex at most 2 X ocelli wide; F2 less than 1.5 X as long as wide; the shiny genal fossa at the front edge at most slightly thickened.

Thorax: Mesoscutum with flat shiny intervals, at every point a squamous hair; posterior margin of scutellum rounded; fore coxa in the middle with a small but significant tooth;

Abdomen: Posterior margin of T6 with 8 spines; posterior margin of S4 midially with small notched V-shape; the reduced T7 does not extend out from behind T6, in the middle at most square; 2nd and 3rd abdominal terga with significant lateral transverse groove (Fig. 4).

Material Examined: 1 ♀, 4. IX.1953 kom oshim, (Fayoum) coll. Ali [ASUS]

Extralimital Distribution: Palestine and Turkey (Warncke, 1992)

***Coelioxys erythrurus* Spinola, 1838**

Coelioxys elytrura Spinola 1838, p.532-533

Coelioxys stolidus Nurse 1903, p.548

Coelioxys indica Friese 1925, p. 32-33

Female Description: (after Alfken, 1934 and Warncke, 1992)

Body Length: 11 mm.

Colour: T1 and T6 more or less red.

Pubescence: Body with squamous hair; T6 laterally with narrow fringe; bandages very wide, from three to four row, the posterior scales longer than the anterior.

Thorax: Mesoscutum densely punctate, covered with basic tufts of scales, midially with scattered strong punctures, distance inbetween more than 1 punctures wide, interspaces densely granular and dull. fore coxa rounded from upper margin.

Abdomen: T5 and T6 strongly narrowed posteriorly; T6 extended triangular pointed, dull and pointed apically, with dense and fine punctate, with 3 longitudinal carina, one central and 2 lateral, apical half laterally with double bar.

Male Description:

Body length: 9.5-12 mm

Colour: Body black; T6 red

Head: The shiny genal fossa ears like with hairs, with small punctures on the outer corner.

Thorax: Mesoscutum densely punctate.

Abdomen: T6 broad, with a long, pointed red lateral teeth; with irregular 8 teeth, exterior ones of 4 upper teeth are higher than the inner; middle of T7 usually extended in a significant tip that protrudes below the posterior margin of the last tergum.

Extralimital Distribution: Turkey, North India (Warncke 1992).

***Coelioxys haemorrhoea* Förster, 1853**

Coelioxys haemorrhoea Förster 1853, p.285-286

Coelioxys coturnix Perez 1884, p.278-279

Coelioxys ruficaudis Cameron 1913, p. 122

Female Description :

Body Length: 7-7.5 mm; fore wing: 4.5 mm.

Color: body, scape, pedicel and T6 basally black; mandible, antenna (except last segment blackish), legs (except for coxa), tegula, T6 apically and S6 red (Fig.30); wing membranous, slightly fumigated apically; wing venation brown (Fig.33).

Pubescence: Face and gena clothed with short recumbent white hairs; mandible dorso-basally with short scaly white hairs; vertex with sparse white hairs (Fig.30); mesoscutum with sparse yellow short hairs, basally with tufts of scaly hairs; scutellum basally and posteriorly with scaly white hairs; mesopleuron with dense short and white scaly hairs; propodeum with long recumbent normal white hairs; legs dorsally with dense and short white scaly hairs; anterior surface of T1

with sparse recumbent white hairs; posterior margin of abdominal terga with dense bandages of scaly white hairs, weak medially (Fig.30); abdominal sterna with broad and dense bandages of scaly hairs, interrupted medially .

Head: In dorsal view 1.2 X slightly broader than long and 1.5 X wider than pronotum; frons and vertex densely punctate; clypeus slightly convex basally, densely punctate, punctures on clypeus superficial than elsewhere, apical margin rounded; ocellular distance (OOD) 1.25 X slightly longer than interocellar distance (IOD); eyes hairy; malar space neglected; mandible cylinder with a cute three teeth; F1 narrower basally, as long as F2; F2–F10 1.25 X longer than broad.

Thorax: Pronotum hardly visible from dorsal view; scutum and scutellum coarse densely punctate; posterior margin of scutellum toothed; pronotum and anterior face of mesopleuron carinate fore wing with marginal cell 4 X longer than broad; SMC1 1.28 X longer than SMC2; basal vein roughly convex and meeting vein Cu at acute angle; 2nd m-cu meeting SMC2 sub apically; marginal cell distal to stigma on costa, 3 X shorter than stigma; stigma 3 X longer than broad (Fig.33); fore coxa with a cute small tooth.

Abdomen: Convex from dorsal view, 1.1 X longer than broad; T1 densely punctate, anterior surface of T1 concave and impunctate, with transverse median carina; T2 with flate transverse groove; T3 with lateral groove; T2–T5 densely punctate basally and sparsely punctate apically; T6 basally with sparse and fine punctures and apically with dense, large and strong punctures, medio-apically with small longitudinal carina, posterior margin tapering medially and rounded laterally (Fig.32); S2–S5 densely punctate; S6 densely punctate, punctures small than others, posterior margin protruded and longer than T6.

Male Description:

Body Length: 6 mm; fore wing 5 mm

Color: Body black; mandible, antenna, tegula, legs and T6 red (Fig.29); scape, mandibular teeth and coxa with blackish tint.

Pubescence: Face clothed with short and recumbent white hairs except clypeal disk bare; gena and basal part of mandible with dense white hairs (Fig.29); mesoscutum basally with sparse of erect white hairs; mesopleuron and ventral surface of femur clothed with dense scaly hairs; apical margin of abdominal terga with weak fringe of scaly hairs. T6 with basao-median spot of scaly hairs (Fig.29); abdominal sterna clothed with scaly hairs, interrupted medially.

Head: in dorsal view as long as broad and 1.4 X wider than pronotum (Pl. VII. Fig.1); vertex and gena coarse densely punctate; genal fossa oval and carinated basally; malar space neglected; eyes hairy, ocellular distance (OOD) 1.2 X longer than (IOD); mandible with a cute three teeth; F1 narrow basally, scarcely longer than F2; F2–F10 slightly broader than long; F11 1.2 X longer than broad.

Thorax: Pronotum hardly visible from dorsal view; mesoscutum and scutellum coarse densely punctate; posterior margin of scutellum truncate and toothed laterally; pronotum and anterior face of mesopleuron carinate fore wing with marginal cell 2.5 X longer than broad; SMC1 1.5 X longer than SMC2; basal vein roughly convex and meeting vein Cu at acute angle; 2nd m-cu meeting SMC2 sub apically; marginal cell distal to stigma on costa, 2 X shorter than stigma; stigma 2.5 X longer than broad; fore coxa with a cute small tooth.

Abdomen: Slightly convex, tapering apically, 1.25 X longer than broad; T1 with transverse carina, anterior surface concave; T2 and T3 with transverse median groove; T5 toothed laterally; T6 depressed medially, with 9 teeth (laterals teeth triangular, small and straight; median two teeth smallest; lower two teeth largest and cute) (Fig.31); T7 rounded and short beneath T6; posterior margin of S4 emarginated medially with smooth margin

Material Examined: 2♂, Nasr, Bahasia (Beni Sewaif), 13.VIII.2016, coll. A.Shahat; 1♂, Farafra O.(New Vally), 03. IX.2018, coll. A.Shahat; 1♂, Kom Oshim (Fayoum), 08.X.2015 coll. A.Shahat; 1♂, Siwa O.(Marsa Matrouh) , 11.IX.2015, coll. A.Shahat; 1♀, Baharia O. (Giza); 26–28.IX.2013, coll. A.Shahat; 2♀, 1♂ Kom Oshim (Fayoum), 12.VIII.2016. coll. A.Shahat; 1♀, 2♂,

3 Anany, Salhya (Sharkia) 9-10.VIII.2015 [Author collection].

Extralimital Distribution: Morocco, Algeria, Spain, Turkey, Tadgakistan, Turkmenistan, Uzbekistan (Warncke 1992).

***Coelioxys haemorrhoea rhodacantha* Cockerell, 1931**

Female Description: (after Alfken 1934)

Length: 7-7.5 mm.

Colour: Antenna black basally and red distally; wing yellow-brown; abdomen color varies, T1 and T6, sometimes T2, T3-T5 red; lateral spines of abdominal terga also red.

Thorax: Mesoscutum basally with tufts of squamous; mesoscutum and scutellum coarsely wrinkled punctate, the latter covered with squamous hairs.

Abdomen: T6 medially, subapically with carina; with rounded posterior margine.

Male Description:

Body Length: 6 mm; fore wing 5 mm

Color: Body black; mandible, antenna, tegula, legs and T6 red (Fig. 1); scape, mandibular teeth and coxa with blackish tint.

Pubescence: Face clothed with short and recumbent white hairs except clypeal disk bare; gena and basal part of the mandible with dense white hairs (Fig. 27); mesoscutum basally with sparse of erect white hairs (Fig. 1); mesopleuron and ventral surface of femur clothed with dense scaly hairs; apical margin of abdominal terga with weak fringe of scaly hairs. T6 with basao-median spot of scaly hairs (Fig. 28); abdominal sterna clothed with scaly hairs, interrupted medially.

Head: in dorsal view as long as broad and 1.4 X wider than pronotum; vertex and gena coarse densely punctate; genal fossa oval and carinated basally; malar space neglected; eyes hairy, ocellocular distance (OOD) 1.2 X longer than (IOD); mandible with a cute three teeth; F1 narrow basally, scarcely longer than F2; F2-F10 slightly broader than long; F11 1.2 X longer than broad.

Thorax: Pronotum hardly visible from dorsal view; misoscutum and scutellum coarse densely punctate; posterior margin of scutellum truncate and toothed laterally (Fig. 27); pronotum and anterior face of mesopleuron carinate fore wing with marginal cell 2.5 X longer than broad; SMC1 1.5 X longer than SMC2; basal vein roughly convex and meeting vein Cu at acute angle; 2nd m-cu meeting SMC2 sub apically; marginal cell distal to stigma on costa, 2 X shorter than stigma; stigma 2.5 X longer than broad (Fig. 26); fore coxa with a cute small tooth.

Abdomen: Slightly convex, tapering apically, 1.25 X longer than broad; T1 with transverse carina, anterior surface concave; T2 and T3 with transverse median groove; T5 toothed laterally; T6 depressed medially, with 9 teeth (laterals teeth triangular, small and straight; median two teeth smallest (Fig. 28); lower two teeth largest and cute); T7 rounded and short beneath T6; posterior margin of S4 emarginated medially with smooth margin

Material Examined: 1♂, Gabal asfar (Qaliubya), 30.V.1956; 1♂, Mansouriah (Giza), 23.IV.1954. [ASUA].

Extralimital Distribution: Morocco, Algeria, Spain, Turkey, Tadgakistan, Turkmenistan, Uzbekistan (Warncke, 1992).

***Coelioxys obtusus* Pérez, 1884**

Coelioxys obtusa Perez 1884, p.279-282.

Coelioxys ruficauda Lepeletier 1841.

Coelioxys aegypticola Friese 1925, p.33.

Female Description:

Body length: 8-8.5 mm; fore wing: 5.5 mm.

Color: body black; antenna blackish-brown dorsally, reddish beneath; mandible, legs, T6 apically and abdominal sterna red; tegula and wing venation brown; wing fumigated, darker apically.

Pubescence: Face clothed with short recumbent pale hairs; vertex with sparse short white hairs (Fig.38); gena clothed with short recumbent snow-white hairs; mandible basally with short

white hairs, apicodorsally with sparse long yellow hairs; mesoscutum basally and laterally with sparse of scaly white hairs; scutellum basally with two tufts of scaly white hairs; tegula basally with long recumbent white hairs; mesopleuron, ventral side of femur, tibia dorsally and basal segment of tarsus clothed with dense snow white hairs; tarsus ventrally with yellow hairs; tibial spure yellow; abdominal terga with white bandages, more dense and thickened laterally; abdominal sterna with broad bandages, narrow medially.

Head: In dorsal view 1.1 X slightly broader than long and 1.3 X wider than pronotum; frons and vertex densely punctate (Fig. 38); clypeus slightly convex basally; eyes hairy; ocellular distance (OOD) 1.6 X slightly longer than interocellar distance (IOD); malar space neglected; mandible cylinder with acute three teeth; F1 narrower basally, slightly longer than F2; F2–F10 as long as broad; F10 1.25 X longer than broad.

Thorax: Pronotum hardly visible from dorsal view; scutum and scutellum shiny and densely punctate; posterior margin of scutellum toothed; pronotum and anterior face of mesopleuron carinate; fore wing with marginal cell 4 X longer than broad; SMC1 1.1 X longer than SMC2; basal vein roughly convex and meeting vein Cu at acute angle; 2nd m-cu meeting SMC2 sub apically; marginal cell distal to stigma on costa, 2 X shorter than stigma; stigma 2.5 X longer than broad; fore coxa rounded with very fine angle.

Abdomen: Convex from dorsal view, 1.6 X longer than broad; T1 densely punctate, anterior surface of T1 concave and impunctate, with transverse median carina; T2–T4 with flat transverse groove; T2–T5 densely punctate basally and sparsely punctate apically; T6 convex basally with densely and fine punctures, apically coarse punctate (large and strong punctures), medio-apically with small longitudinal carina, posterior margin tapering and truncate medially (Fig. 37); S2–S5 sparsely punctate; S6 parallel sides, densely punctate, punctures small than others, posterior margin protruded and longer than T6.

Male Description:

Body Length: 7.5 mm; fore wing 4.5 mm.

Color: Head including scape, pedicel and F1, thorax including fore coxa and T1–T4 black (Fig. 34); flagellum, mandible, T5–T6 and abdominal sterna red; tegula brown; wing venation brown; wing slightly fumigated with slight metallic reflections.

Pubescence: Face and clypeus clothed with long recumbent white hairs; vertex with sparse scaly hairs (Fig. 35); gena and basal of mandible clothed with short recumbent white hairs; mesoscutum basally and laterally with sparse scaly hairs; scutellum basally with fringe of scaly hairs; mesopleuron and ventral of femur clothed with dense snow white scaly hairs; tibia dorsally and basal segment of tarsus clothed with scaly hairs; abdominal terga and sterna as female; T6 surrounded laterally with scaly hairs.

Head: in dorsal view slightly longer than broad and 1.3 X wider than pronotum; frons and vertex sparsely punctate; clypeus slightly convex basally; eyes hairy (Fig. 35); ocellular distance (OOD) 1.7 X slightly longer than interocellar distance (IOD); malar space neglected; mandible cylinder with acute three teeth; F1 narrower basally, slightly longer than F2; F2–F10 slightly broader than long; F11 1.25 X longer than broad.

Thorax: as female.

Abdomen: slightly convex, tapering apically, 1.4 X longer than broad; T1 with a transverse carina, anterior surface concave; T2, T3 and T4 with transverse median groove; T5 laterally with groove and depressed sub apically; T5 toothed laterally; T6 depressed medially, with 8 teeth (laterals teeth triangular, small and dull; median two teeth as carina; lower two teeth largest) (Fig. 36).

Material Examined: 1♂, 1♀, Harghada (Red sea), 20.IV. 2019 coll. N.Gadallah [author collection].

Extralimital Distribution: Morocco, Italy and Turkey (Warncke, 1992).

***Coelioxys rufispina* Walker, 1871**

Coelioxys afra var *intacta* Friese, 1922.

Female Description:

Body Length: 9 mm; fore wing: 5 mm.

Color: body including antennal scape black (Fig.41); mandible, antenna, tegula, apical part of T6, S5 and S6 red.

Pubescence: Face clothed with long and recumbent white hairs except supra clypeal area bare (Fig.41); gena clothed with short and recumbent white hairs; mesoscutum with lateral tufts of scaly hairs; mesopleuron with scaly hairs; propodeum with long white hairs; posterior margin of abdominal terga with weak fringe of scaly hairs, dense laterally (Fig.39); abdominal sterna with scaly hairs, bare medially.

Head: In dorsal view 1.3 X slightly broader than long and 1.4 X wider than pronotum; vertex coarse densely punctate (Pl. XI. Fig.2); clypeus slightly convex medially, densely punctate, apical margin rounded; ocellocular distance (OOD) as long as interocellar distance (IOD); eyes hairy; malar space neglected; mandible cylinder with acute three teeth; F1 narrower basally, as long as F2; F2–F9 1.25 X wider than long; F10 slightly longer than broad.

Thorax: Pronotum hardly visible from dorsal view; scutum and scutellum coarse densely punctate; posterior margin of scutellum rounded and toothed laterally; pronotum and anterior face of mesopleuron carinate fore wing with marginal cell 5 X longer than broad; SMC1 1.4 X longer than SMC2; basal vein roughly convex and meeting vein Cu at acute angle; 2nd m-cu meeting SMC2 sub apically; marginal cell distal to stigma on costa, 2.5 X shorter than stigma; stigma 2.6 X longer than broad (Fig.44); fore coxa with a cute small tooth.

Abdomen: Convex from dorsal view, 1.4 X longer than broad; T1 densely punctate, anterior surface of T1 concave and impunctate, with transverse median carina; T2 and T3 with median groove; T2–T5 densely punctate basally and sparsely punctate apically, punctures apically large; T6 convex, basally with sparse and large punctures and fine apically; posterior margin of T6 carinated laterally (Fig.39); S2–S5 densely punctate; S6 densely punctate, punctures small than others, posterior margin protruded and longer than T6.

Male Description:

Body Length: 8 mm; fore wing 5.5 mm

Color: Body black; antenna, mandible, tegula, leg and T6 red (Fig.40).

Pubescence: Face clothed with short and recumbent white hairs; gena and basal part of mandible with white hairs; mesoscutum with lateral tufts of white scaly hairs; mesopleuron clothed with scaly hairs; posterior margin of abdominal terga with weak fringe of white hairs, interrupted medially and dense laterally; abdominal sterna with white scaly hairs, interrupted medially.

Head: in dorsal view as long as broad and 1.1 X wider than pronotum; vertex and gena coarse densely punctate (Fig.43); genal fossa semi-rounded and carinated basally; malar space neglected; eyes hairy, ocellocular distance (OOD) 1.25 X slightly longer than (IOD); mandible with dull three teeth; F1 narrow basally, scarcely longer than F2; F2–F10 as long as wide; F11 1.5 X longer than broad.

Thorax: as female.

Abdomen: Slightly convex, 1.1 X longer than broad; T1 with transverse carina, anterior surface concave; T2 and T3 with basal transverse median groove; T4 and T5 laterally with groove; T5 toothed laterally; T6 depressed medially, with 9 teeth (laterals teeth triangular, small and straight; median two teeth smallest; lower two teeth largest; between two groups a small tooth) (Fig.42); T7 rounded and short beneath T6; posterior margin of S4 complete.

Material Examined: 1♂, Pyramid (Giza), 9.VII. 1953, coll. Ali; 1♂, Gabal Asfar (Cairo), 8.VII.1953; 1♂, Kom Oshim (Fayoum), 01. VIII.1953, coll. Ali; 1♂, Fayoum, 5.V.1952, coll. S.L.M; 1♀, Mansouria (Giza); 23.IV.1953; 1♀, Pyramid (Giza), 12.VII.1953, coll. Ali; 1♀, Kom Oshim (Fayoum), 4.IX.1953 [ASUA].

Subgenus *Liothyrapis*:

Liothyrapis is represented by lonely species.

***Coelioxys decipiens* Spinola, 1838**

Coelioxys decipiens Spinola, 1838, p.532.

Coelioxys farinose Smith 1854, p 260-261.

Female Description: (after Alfken 1934, Nadimi *et al* 2013 and Klaus 1992)

Body Length: 9-12 mm

Pubescence: Body black; surface dusty-like with a fine, dense gray hairs; posterior margins of T1-5 with a fine fringes laterally widened.

Head: F1 more than half as long as F2.

Abdomen: T6 with fine hairs, almost without sculpture, apically with sharp teeth, broadly rounded at the end, with some bristles; S6 broad rectangular, pointed apically.

Male Description:

Body Length: 8-11 mm; fore wing 4-6 mm

Color: Body including scape, pedicel, mandible and legs (except fore and mid tarsus) shiny black; flagellum, tegula, fore and mid tarsus reddish-brown (Fig. 45); tibial spur and wing venation brown; wing membranous, slightly fumigated apically.

Pubescence: Face, clypeus and gena clothed with long recumbent white hairs; mandible basally with short recumbent white hairs (Fig. 46); mesopleuron and femure ventrally clothed with long recumbent white hairs; abdominal terga with white bandages more interrupted medially (Fig. 47); abdominal sterna clothed with long and recumbent white hairs, apical bandages dense; fore tarsus ventrally with yellow setae, mid and hind tarsus with pale setae; (all hairs of normal type, not scaly hairs).

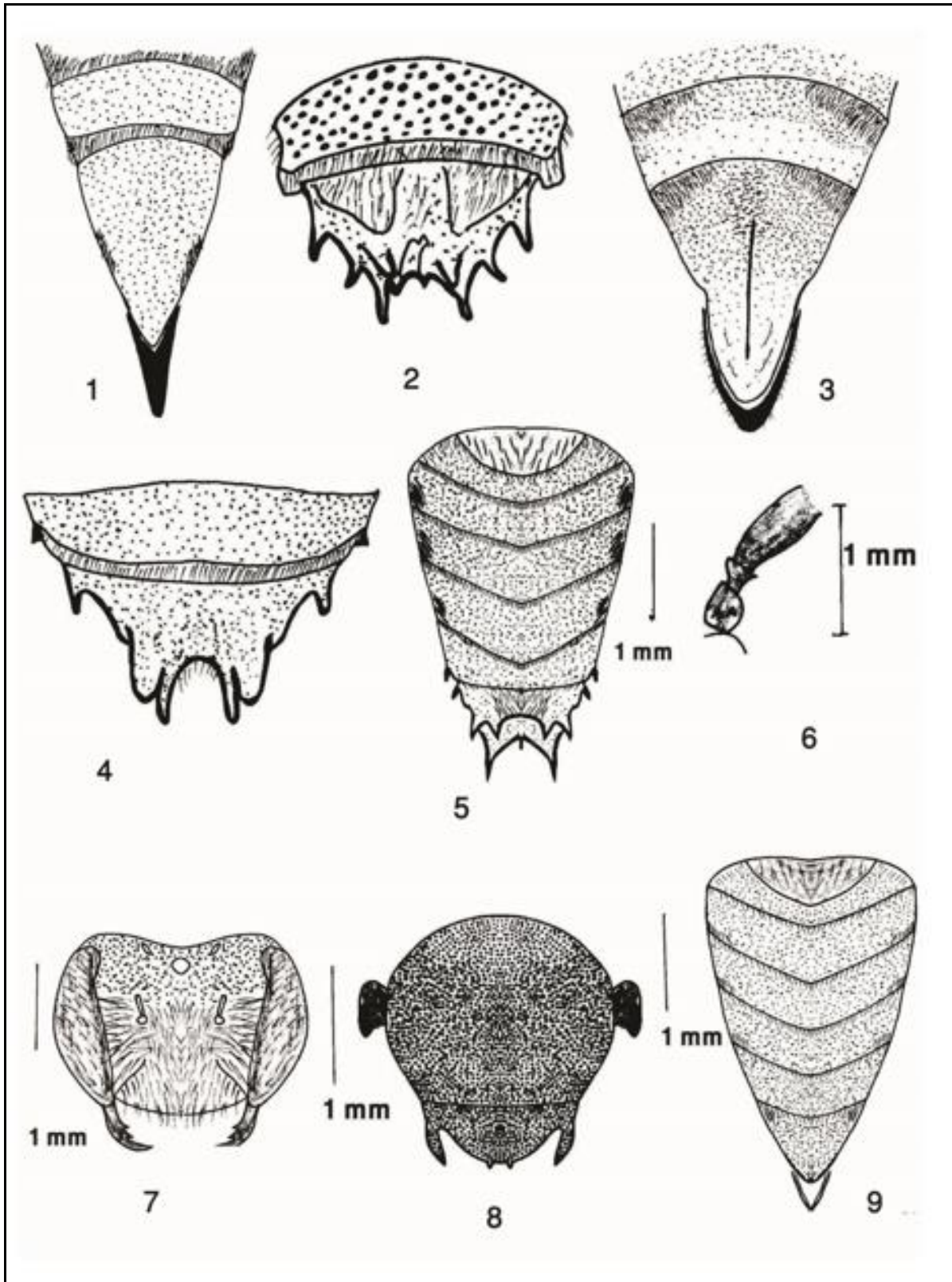
Head: in dorsal view 1.3 X longer than broad; and 1.25 X wider than pronotum (Pl.XII. Fig. 1); frons densely punctate; vertex sparsely punctate, punctures on frons more fine (Fig. 46); gena sparsely punctate, punctures large and superficial; genal fossa longitudinal; malar space neglected; eyes bare, ocellular distance (OOD) as long as (IOD); mandible with a cuneate three teeth; F1 narrow basally, scarcely longer than F2; F2-F10 slightly longer than wide; F11 depressed, 1.3 X longer than broad.

Thorax: Pronotum hardly visible from dorsal view; scutum and scutellum coarse densely punctate, punctures large and deep; posterior margin of scutellum protruded medially (Fig. 45); pronotum and anterior face of mesopleuron carinate; fore wing with marginal cell 3.5 X longer than broad; SMC1 1.3 X longer than SMC2; basal vein roughly convex and meeting vein Cu at acute angle; 2nd m-cu meeting SMC2 sub apically; marginal cell distal to stigma on costa, 2.5 X shorter than stigma; stigma 2.8 X longer than broad; fore coxa with a long triangular tooth.

Abdomen: Robust, slightly convex, 3.25 X longer than broad; T1 with transverse carina, anterior surface concave; T2 with transverse median groove; T3, T4 and T5 laterally with groove; T5 without tooth laterally (Fig. 47); T6 depressed medially, with 6 sharp and long teeth, in the middle of emargination there is a small tooth (Fig. 48); T7 rounded and short beneath T6; all terga densely punctate of fine punctures; posterior margin of S4 with wide emargination.

Material Examined: 4♂, Monsa, Ashmon (Monofya), 5.V. 2016, coll. A. Shahat; 1♂, K. Hamam (Sharkia), 07.IV.2016 coll. A. Shahat [author collection].

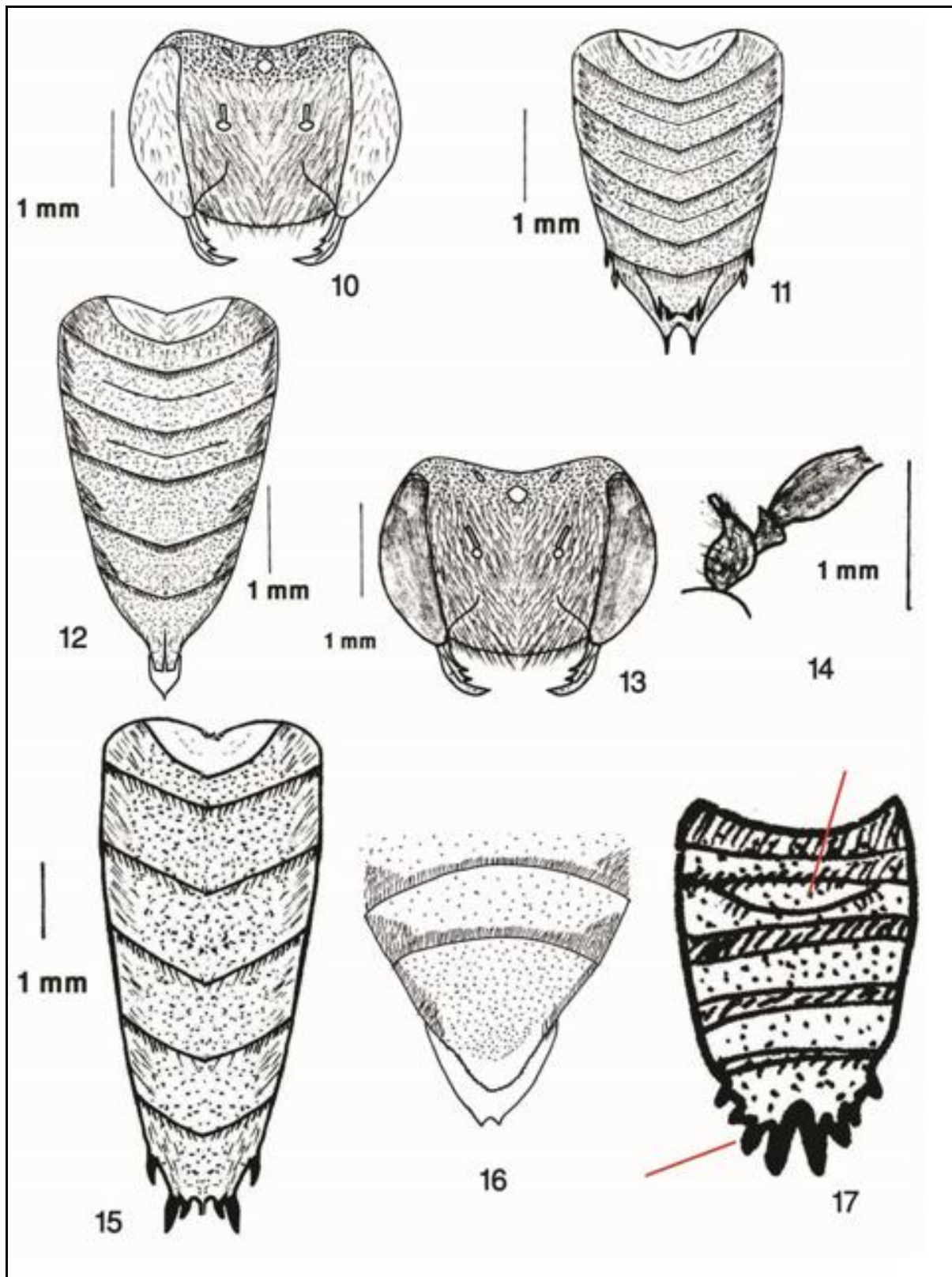
Extralimital Distribution: Morocco, Turkey, Tadgakistan, Turkmenistan (Warncke 1992).



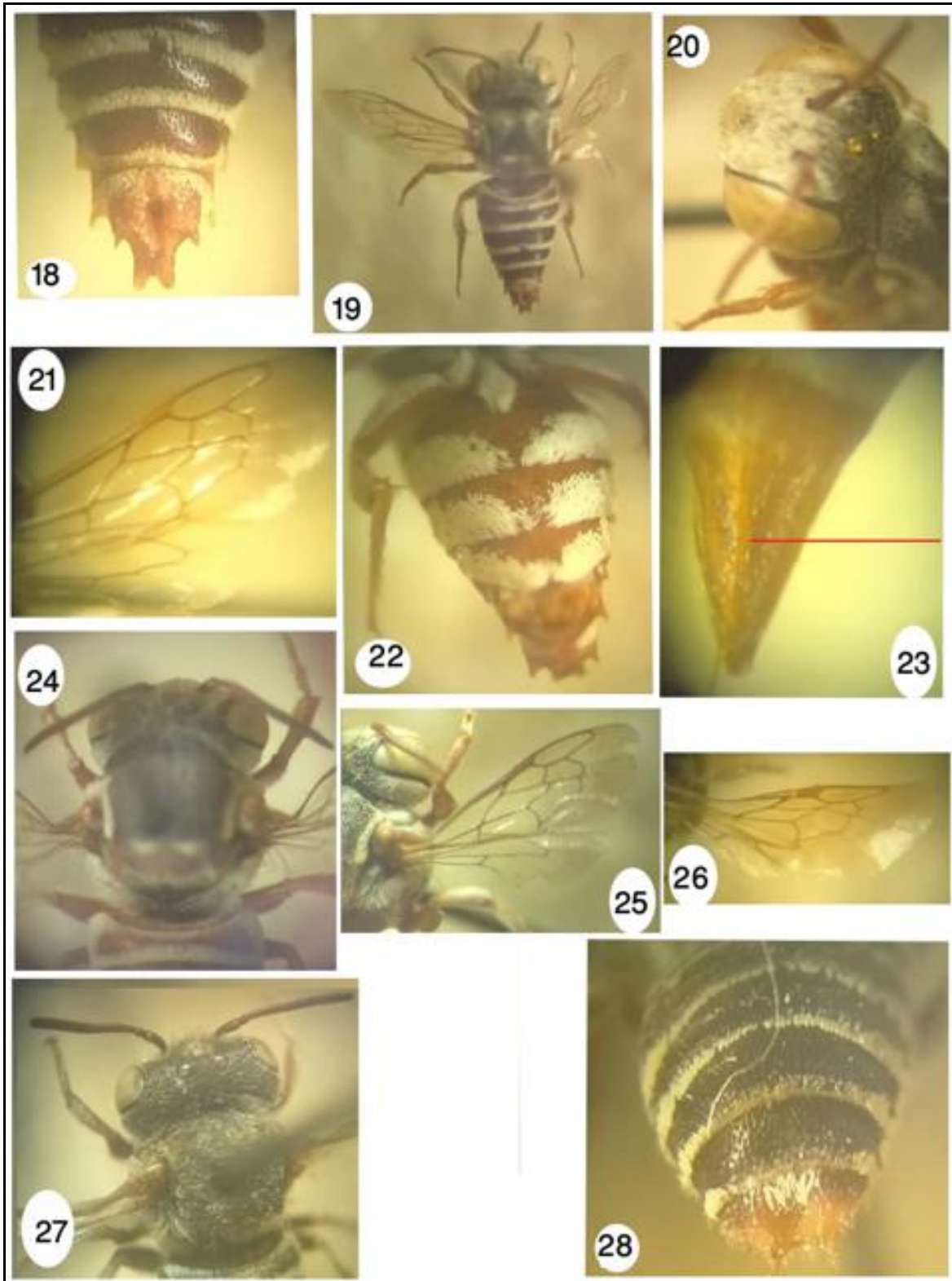
Figs. 1-2. *Coelioxys echinatus* Förster 1853: 1. T5-T6♀ (dorsal view); 2. T6♂. (after Ortiz-Sanchez *et al.*, 2009)

Figs. 3-4 *Coelioxys conoidea* Illiger 1806: 3. T6♀; 4. T6♂ (dorsal view). (after Ortiz-Sanchez *et al.*, 2009).

Figs. 5-9: *Coelioxys haemorrhoea* Förster, 1853. 5. Abdomen♂ (dorsal view), 6. Coxa♂; 7. Head♀ (frontal view), 8. Thorax♀ (dorsal view), 9. Abdomen♀ (dorsal view).



Figs.10-12: *Coelioxys obtusus* Pérez, 1884: 10. Head ♂ (frontal view); 11. Abdomen ♂ (dorsal view); 12. Abdomen ♀ (dorsal view).
Figs. 13-17. *Coelioxys decipiens* Spinola ♂, 1838: 13. Head (frontal view); 14. Fore coxa; 15. Abdomen (dorsal view); 16. T6 ♀ *C. afra*; 17. Abdomen ♂ *C.elegantula*.



Figs. 18-22. ♂ *Coelioxys afra* Lepeletier, 1841: 18. Abdominal terga (dorsal view), 19. Habitus (dorsal view), 20. Head (frontal view); 21. Fore and hind wing; 22. Abdominal sterna.

Figs. 23-25: ♀ *Coelioxys elegantula* Alfken, 1934: 23. T6 (dorsal view); 24. Head and thorax (dorsal view), 25. Fore and hind wing.

Figs. 26-28 : ♂ *Coelioxys haemorrhhoa rhodacantha* Cockerell, 1931: 26. Fore wing; 27.. Head and thorax (dorsal view), 28. Abdomen (dorsal view).



Figs. 29-33: *Coelioxys haemorrhoea* Förster, 1853. 29. Habitus ♂; 30. Head and thorax ♀ (dorsal view); 31. T6 ♂ (dorsal view); 32. T6 ♀ (dorsal view); 33. Fore wing ♀.

Figs. 34-38: *Coelioxys obtusus* Pérez, 1884: 34. Habitus ♂; 35. Head ♂ (frontal view); 36. Abdomen ♂ (dorsal view); 37. T6 ♀; 38. Head ♀ (dorsal view).



Figs.39-44. *Coelioxys rufispina* Walker, 1871: 39.Abdomen ♀(dorsal view), 40. Habitus ♂; 41.Head ♀(frontal view); 42. T4-T6♂; 43. Head♂(frontal view); 44. Fore wing♀.

Figs. 45-48. *Coelioxys decipiens* Spinola ♂, 1838: 45. Head and thorax (dorsal view); 46. Head (frontal view), 47. Abdomen (dorsal view), 48. T6 (dorsal view).

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ARABIC SUMMARY

مراجعة تصنيفية لجنس كوليوكسس عائلة ميجاكيلدى من مصر

أحمد محمد الشحات – محمد طه طه حسنى – أحمد مصطفى جلهوم
قسم علم الحيوان- كلية العلوم(بنين)- جامعة الأزهر - القاهرة

هذا البحث يحتوى على دراسة ومراجعة تصنيفية لجنس كوليوكسس، عائلة ميجاكيلدى وهذه المراجعة و الدراسة بناءا على العينات التى تم تجميعها فى الفترة من 2015- 2019 وكذلك العينات المحفوظة فى المجموعات الحشرية المصرية. حيث يوجد فى مصر عشرة انواع واشتملت الدراسة على مفتاح للانواع المصرية ذكورا واناثا وكذلك وصف ورسومات توضيحية وصور للانواع المصرية وأيضا خريطة توضيحية لأماكن انتشار هذه الانواع.