Survey and Taxonomical Studies on Cleptoparasitic Bees from Genus *Coelioxys* (Hymenoptera: Megachilidae) in Egypt

A. A. El-Saeady, Sh. F. Hafez, M. K. Abied, and A. H. Abdel-All *

Department of Plant Protection, Faculty of Agricultur, Al-Azhar University, Cairo, Egypt.

* Corresponding author E-mail: ahmedhassan95@azhar.edu.eg (A. Abdel-All)

ABSTRACT:

This group includes the genus *Coelioxys*, commonly known as cuckoo bees, which exhibit interesting parasitic behaviors. *Coelioxys* larvae rely on food stolen from leaf-cutter bees, particularly Megachile latreille larvae. Notably, the emergence of the *Coelioxys* egg occurs before the emergence of the Megachile egg, allowing the young larvae to use their powerful mandibles to detach the Megachile egg, thus ensuring their survival. The genus *Coelioxys* comprises approximately 500 species, divided into 15 genera worldwide. These bees exhibit a parasitic lifestyle, laying their eggs inside the nests of other wild bees, often of the same or closely related genus, especially Megachile. Therefore, a comprehensive inventory was necessary to identify the species present in Egypt. This was accomplished as follows: A comprehensive inventory and review of the genus Coelioxys latreillei, which belongs to the family Megachilidae, subfamily Apoidea, and order Hymenoptera, was conducted in Egypt. This study is based on field specimens collected in Egypt between 2021 and 2024, and was first described in 1809. The identified species were included in reference insect collections at universities and scientific research institutions. These species were described, and their morphological and taxonomic characteristics were explained. A taxonomic key was developed to distinguish between males and females recorded in Egypt. To date, nine species and one subspecies have been documented in Egypt: *(Coelioxys afra, Coelioxys conoidea, Coelioxys echinatus, Coelioxys elegantula, Coelioxys erythrurus, Coelioxys haemorrhoa, Coelioxys haemorrhoa rhodacantha, Coelioxys obtusus, Coelioxys rufispina), and one subspecies, (Coelioxys decipiens).*

Keywords: Pollinator classification; Insect morphology; Parasitoid interactions; Biodiversity assessment.

INTRODUCTION

Hymenoptera constitutes an order of insects that encompasses a diverse array of groups, such as bees, wasps, ants, sawflies, gall wasps, and their relatives. Within this classification, bees, which are members of the family *Apidae*, are particularly noted for their feathery bristles found near the bases of their wings. A fascinating example within this group is the genus *Coelioxys*, commonly known as cuckoo bees, which display intriguing parasitic behaviors. The larvae of *Coelioxys* rely on sustenance pilfered from leaf-cutter bees, specifically those of the *Megachile latreille* species. Notably, the emergence of the *Coelioxys* egg occurs before that of *Megachile*, allowing the fledgling larva to use its strong mandibles to eliminate the *Megachile* egg, thereby ensuring its own survival.

The *Coelioxys* genus consists of roughly 500 species, organized within 15 genera worldwide. These bees exemplify a cleptoparasitic lifestyle, laying their eggs within the nests of other wild bees, frequently within the same genus or closely related genera, particularly *Megachile*. Their period of activity lasts from June to September, during which the larvae consume the reserves accumulated by the host. Pupation takes place in a cocoon crafted inside the host cell, allowing the larvae to remain in a pre-pupal stage throughout the winter. Some species within the genus *Anthophora* excavate nests in sandy environments or decaying wood, which can additionally serve as hosts for *Coelioxys* larvae. As highly specialized parasitoids, *Coelioxys* species tend to focus on a limited range of host species. These bees are often spotted in Egypt between June and September while visiting flowers. As female *Coelioxys* possess the ability to sting, male individuals are known to produce a noxious odor if consumed.

Morphologically, *Coelioxys* bees are characterized by a predominantly black coloration adorned with white banding on the abdomen. Their legs may be either black or red. Males possess a distinctive W-shaped abdomen, while females feature elongated, spear-like abdomens used for oviposition and defense. These bees infiltrate the nests of other species, where they can pilfer food, eliminate host larvae, or even take control of a hive when the queen is no longer present. This behavior aligns with the Emery phenomenon,

a characteristic trait observed in certain semi-social insects. The maxillae of *Coelioxys* extend forward, in a manner reminiscent of the behavior exhibited by cuckoo birds.

Alfken undertook the initial revision of the *Coelioxys* genus in Egypt in 1934, identifying a total of ten species. Notably, *C. gymnopygia*, described in Spinola, M 1838, was another synonym with *C. rufiventris* and reclassified under the Genus *Radsowskina*. Additional species were amalgamated in subsequent studies. A more comprehensive analysis was executed by Warncke in 1992, which revised 29 Palaearctic species, including those present in Egypt. The most recent investigation was conducted by Salem and El Azab in 2017, who reviewed the species of *Megachilidae* in Egypt, including *Coelioxys*, and highlighted the necessity for taxonomic updates.

Coelioxys specimens share distinct morphological traits. Females possess a narrow, pointed abdomen and lack scopal hairs while exhibiting long, spined maxillae. Males demonstrate six to nine prominent spines on the posterior margin of T6, and in certain species, both sexes may have eyes covered with fine hair. As cleptoparasites targeting *Megachile*, *Anthidiini*, and *Osmiini* bees, females utilize their elongated, pointed abdomens to penetrate host nests with their ovipositor, directly depositing eggs into stored provisions, as noted by Michener in 2007. *Coelioxys* bees are found on Most continents, excluding Australia (Michener, 2007). In the governorates of Egypt, the genus includes nine species and one subspecies. This study features an illustrated identification key, a faunistic list(Insect), and a distribution map for the Egyptian *Coelioxys* species.

MATERIALS AND METHODS

This study employed a collection of samples from the genus *Coelioxys*, gathered between 2021 and 2024 using a sweep net across various sites (as detailed in Table 1 and represented in Map 1), in addition to specimens sourced from Egyptian warehouses. All collected samples were preserved at the Entomological Collection of the Plant Protection Department at the Faculty of Agriculture, Al-Azhar University, located in Cairo, Nasr City, District 6, Egypt. Careful separation and preservation of specimens were done based on their morphological traits and preservation needs.

The examined material was viewed under a binocular microscope, where morphological terms were derived from Michener (2007), and body sculpture terms were informed by Harris (1979). For the illustrations and descriptions, an Olympus Binocular (model Olympus AZ 61) was utilized. Drawings were created using a combination of pencil, ink pen, scanner, and millimeter notebook, with photographs taken by mobile iPhone cameras equipped with square and micrometer eyepieces. Image afee processing was performed using Adobe Photoshop (version 7.0 ME).

To create maps for this research, a raster-format map obtained from Wikimedia Commons was referenced, with locations identified using ArcGIS 9.3.1.

The investigation included a thorough search of the following entomological repositories for additional specimens belonging to the *Coelioxys* genus**:**

AUCE: Entomological Collection (Alfieri), Department of Plant Protection, Faculty of Agriculture, Al-Azhar University.

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

CUE: Entomological Collection of the Faculty of Science, Cairo University (Efflatoun Bey).

PPDD: Entomological Museum of the Department of Survey and Taxonomy Research, Plant Protection Research Institute.

Abbreviations utilized in this study include:

F1, F2, F3, etc. for the first, second, third, etc., antennal flagellomeres.

IOD for interocellar distance.

OOD for ocellocular distance.

SMC1 and SMC2 for the first and second submarginal cells.

T1, T2, T3, etc. refer to the first, second, third, etc., abdominal terga.

S1, S2, S3, etc. denote the first, second, third, etc., abdominal sterna.

RESULTS AND DISCUSSION

A taxonomic key for the genus Coelioxys Latreille was first established in 1809 in Egypt. The genus is divided into two subgenera:

Subgenus *Liothyrapis* – represented solely by *Coelioxys decipiens*.

Subgenus *Allocoelioxys* – which includes the remaining nine species under investigation.

Key to the Subgenera of *Coelioxys* Latreille, 1809

Eyes without hairs (see Fig.13) and abdominal bandages with normally distributed hairs

Coelioxys (Liothyrapis) (C. decipiens)

Eyes with hairs (see Fig.7) and abdominal bandages with squamous hairs *Coelioxys (Allocoelioxys)*

Key to the Female Species of Subgenus *Coelioxys* (*Allocoelioxys*)

(Modified from Alfken, 1934 and Warnke, 1992)

Fore coxa with a wide triangular tooth (see Fig.14); body with normal hair '; the last sternum is not laterally serrated and is notably wider than the last tergum; last sternum narrows moderately; the length of hair's on the clypeus is uniform; metasomal terga and sterna bear large, triangular lateral bandages; the clypeus displays short hairs; mandibles are typical; the external spur of the posterior leg is blunt.→ *Coelioxys conoidea*

Fore coxa rounded from the upper margin (Fig. 6); body with the scaly hair → 2

Body length at least 11 mm → 3

Body length at most 9 mm → 5

T6 specular, very coarsely wrinkly, with a single longitudinal beam medially (Fig. 37), vast lateral fringe; metasomal color variable, usually only T6, rarely entire metasoma red; scale bandages narrow, two-row, scales equal length; last twain terga similar width posteriorly, last tergum with broader context margin, densely hairy; mesonotum coarsely wrinkled-punctate, not covered with scales between punctures; 11-12 mm → *C. obtusus*

T6 dull, densely and finely punctate, with 3 longitudinal carinae (one central, two lateral), narrow lateral fringe → 4

Mesoscutum medially with scattered strong holes, interspaces wider than holes, densely granular and dull; last tergum red, apical half laterally with double bar → *C. erythrurus*

Mesoscutum coarsely punctate, interspaces tight, specular; last tergum laterally with simple margin; antennae and legs dark; last tergum bare; mesopleuron sparsely long-haired → *C. echinata*

Mesoscutum fundamentally with white hairs; T6 medially with sharp subapical carina → 6

Mesoscutum fundamentally without white hairs; T6 medially without or with indistinctly subapical carina → 8

Mesoscutum and scutellum coarsely wrinkly- spotted, scutellum covered with white scaly hairs; T6 with rounded posterior margin → 7

Mesoscutum is finely and weakly wrinkly-spotted with a fine medial groove; scutellum is densely and finely punctate, extensively coated in white scales; T6 medially features a longitudinal median carina (see Fig. 24), with a very fine and sparse punctation at the base, and strongly emarginate apex with a small triangular cut medially; T1, T2, and T6 are red; antennae are almost black, transitioning to red at the ends; wings are light yellow-brown; measures 8 mm → *C. elegantula*

Antennae, black, flagellum ventrally more or less red; scutellum lateral spines black or black-brown; abdomen black excepting T6 red; 7 mm → *C. haemorrhoa*

Antennae are black at the base, Red towards the tips; wings are yellow-brown; scutellum has red lateral spines; abdominal color is variable: T1 and T6, sometimes T2, T3-5 laterally, or the abdomen may be mostly or entirely red; measures 7-7.5 mm → *C. haemorrhoa rhodacantha*

T6 posterior margin truncate, rounded or very weakly serrated; antennae more or less red; wings more or less reddish-brown; T1 black, evenly punctate; T2-T5 as in *C. afra*; T6 posterior margin rounded or truncate; wing sweating red-brown; 6.5-7 mm *C. rufispina*

S6's posterior margin is deeply roundly emarginate (see Fig. 16); antennae are black, with the flagellum ventrally slightly lighter; T1 exhibits even fine punctation; T2-T5 present sparse fine punctation medially; measures 7-9 mm *C. afra*

Eyes bare (Fig. 49) (subgenus Liothyrapis); S6 broad rectangular, apex pointed *C. decipiens*

Eyes hairy (Fig. 50); S6 pointed, apex largely bare

Key to the Male Species of Subgenus *Coelioxys* (*Allocoelioxys*)

(Modified from Alfken, 1934 and Warnke, 1992)

Abdominal terga with normal hair, sterna bare; vertex at most 3X ocellus width; S4 posterior margin hairbald and clearly wavy, with angular cleft -like teeth; abdominal terga and sterna with wider lateral hair splatter;

hind leg the external spur dark, solid, with a short, almost vertical bend tip; T6 with sharp teeth (Fig. 4) → *C. conoidea*

Abdominal terga with scaly hair; S4 posterior margin continuous (shallowly emarginate in *C. afra*) or not visible under dense pubescence → 2

big species, 9.5-12 mm; T6 with 4the upper teeth more or less fused; T7 prolonged posteriorly and split apically → 3

Smaller species, 6.5-9 mm; T6 with 8, seldom 9, free-standing teeth; T7 broad, deeply roundly emarginate,the end in 2 sharp teeth, not extended posteriorly → 4

T6 broad, black with short, blunt, yellow-red posterior teeth (Fig. 36); 4 upper spines fused into a plate with sharply margined mid-tubercle, monocular longitudinal groove of deep holes laterally, with blunt tuberculate sharp edges posteriorly and fine sharp keel behind pits; T7 laterally weakly toothed, shallowly split apically; 10 mm → *C. obtusus*

T6 wide, red with long, pointed, red On the side teeth; outer pair of 4 the upper spines Top of the inside pair, which are fused into a excavated cavity flash at apex of edged board; T7 with long ventral projection ending in pointed teeth; 9.5-12 mm → *C. erythrurus*

T6 mainly with white hairs; in side thorns pointed and bend downwards; antennae more or less red → 5

T6 mainly with continuous, usually black fringe; lateral spines expanded flat, boring; antennae black → 6

S4 posterior margin shallowly emarginate medially, slightly deeper; T2 without side bar, with hairn tuft from circular depression; mesoscutum coarsely reticulate with soft interspaces; T6 with 8 teeth (Fig. 18) → *C. afra*

S4 posterior margin shallowly emarginate and straight; T2 with lateral cross beam, without tufts; last tergum normal, with arched longitudinal carina basomedially; T2 with lateral groove, roughly punctate posteriorly without hairy pit → *C. echinata*

Abdominal terga evenly strongly and densely dotted; genal spot large, elongate-rounded → 7

Abdominal terga unevenly strongly and densely dotted, very sparsely smooth medially; apical half or almost entire plate red; genal stain small, rounded; 6.5-8 mm → *C. haemorrhoa rhodacantha*

T6 side spines small, pointed, straight or slightly curved laterally (Fig. 31); usually with a median tooth between lower spines, so 9 spines present; 7-8 mm → *C. haemorrhoa*

T6 side spines angulate; T6 more or less red, at least spines red; T6 posterior margin with 8 spines; 7-7.5 mm → *C. rufispina*

iposterior imargin iis itoothed; ia ilongitudinal imedian icarina iis ipresent ion ithe imesoscutum; ithe iscutellum iis iflat→ *C. elegantula*

The imesoscutum ihas iflat, ishiny ispaces, ieach ipoint ibearing ia isquamous ihair; ithe iposterior imargin iof ithe iscutellum iis irounded→8

The body, included the scape, pedicel, mandibles, and legs (except the fore and mid-tarsus), is glossy black→ *C. decipiens*

The Body is black with a dusty surface due to fine, dense gray hairs.

***Coelioxys afra* Lepeletier; 1841**

Synonyms:

Coelioxys afra Lepeletier ; 1841, p. 525-526 (Lectotype).

Coelioxys coronata Förster; 1853, p. 280-282.

Coelioxys mandibularis Chevrier ; 1872, p. 487-489.

Female Description

(Based on Alfken, 1934; Warncke, 1992; Nadimi et al., 2013)

Size: 7-9 mm.

Coloration: Whole body, including antennae, black; ventral flagellum lighter; T1 and last abdominal segment brownish-red.

Pubescence: Covered with squamous hairs; eyes hairy; mesoscutum lacks basal squamous hair spots; T1-T5 with squamous hair bands.

Head: Clypeus finely rugose-punctate; antennofrons and frons with a distinct longitudinal mid-carina; vertex exhibits rough punctation; F2 at most 1.5 times as long as wide, subsequent segments nearly square.

Thorax: Mesoscutum coarsely punctate; fore coxa rounded, without a spine.

Abdomen: T1 uniformly fine-punctate; T2-T5 exhibit scattered fine punctures centrally; T2 and T3 lack transverse grooves; basal halves of T4-T5 finely punctate; T6 lacks a medial subapical carina; apical segments (T6, S6)

broad, moderately narrowed, and rounded at the apex (Fig. 16).

Male Description

Size: 9.5 imm body length; 6 imm iforewing.

Coloration: Black head and thorax; red iantennae, mandibles, tegulae, ilegs, and iabdomen (Fig. i19).

Pubescence: Face and gena densely clothed in short, recumbent white hairs; vertex sparsely clothed in scaly hairs (Fig. i20); mesoscutum sparsely clothed in scaly hairs; mesopleuron densely clothed in scaly hairs; tibial spur yellow; propodeum with long white hairs; posterior edges of abdominal segments ifringed with dense, laterally extensive scaly hairs (Fig. i18); sterna also clothed in scaly ihairs, broken medially; T1 with a longitudinal ifringe iof iscaly ihairs.

Head: Dorsal aspect, as long as wide and 1.14× wider than pronotum; vertex and gena densely and coarsely punctate (Fig. i20); genal fossa oval, basally carinate; malar space absent; eyes pubescent; ocellocular distance (OOD) equal to interocellar distance (IOD); imandibles dull with three teeth; F1 narrow iat ibase, ifaintly ilonger than F2; F2–F10 as ilong as wide; F11 iis 1.2× longer than wide.

Thorax: Pronotum is barely observable from above; both the scutum and scutellum are densely and coarsely punctate; the posterior margin of the scutellum is toothed; both the pronotum and the anterior face of the mesopleuron exhibit carination; the forewing features a marginal cell that is 4.3 times longer ithan broad; SMC1 is 1.1 times longer than iSMC2; ithe ibasal vein curves igently, meeting vein iCu iat ian iacute iangle; ithe second m-cu joins SMC2 subapically; ithe marginal cell, distal to the stigma on the costa, is i2.5 itimes shorter than the stigma, which is three times longer than broad (reference Fig. i21).

Abdomen: The abdomen is slightly convex, measuring 1.15 times longer than wide; T1 possesses a transverse carina with ia concave anterior surface; T2 and T3 contain basal transverse igrooves, iwith ia ilateral groove on T2 incorporating minute hairs (see iFig. i18); T4 and T5 have apical grooves; T5 is equipped with lateral teeth; T6 is grooved medially and displays even iteeth (two ilaterally, three above, and two below, forming a V shape); T7 extends iinto ia long spine; ithe posterior margin of S4 is truncate (refer to Fig. i22).

Specimenexamined

One male was collected in Kom Oshim (Fayoum) ion August 4, 1953, by Ali;

Another malewas found in Barkash (Giza) ion June 5, i1952, also collected by Ali [ASUA].

World Distribution (Warncke, i1992)

Found in Morocco, Tunisia, Turkmenistan, Uzbekistan, Turkey, and Palestine.

***Coelioxys iconoidea* iIlliger, i1806**

Synonyms:

Coelioxys conoidea, first documented by Illiger in 1806, has been dentified under various aliases such as Anthophora conoidea (Illiger, 1806), *Coelioxys aegyptiaca* (Radoszkowski, 1876), and *Coelioxys* punctata (Lepeletier, i1841).

Description iof ifemale i(Based ion iWarncke, i1992)

Pubescence: Clypeus with short white hair; metasomal terga and isterna with huge triangular bandages interrupted medially; body with normal hairs; body mainly with normal hairs

Thorax: iIt ifeatures a wide triangular tooth on the fore coxa and a iblunt outer spur on the hind ilegs.

Abdomen: The abdomen exhibits sparse apical punctures on T4 and T5, with T6 being smaller than iS6, idensely punctate, and featuring ia smooth longitudinal stripe down ithe middle (Fig. i3).

Male Description

Pubescence: Abdominal terga display normal hair, whereas the isterna are bare; laterally, iabdominal isegments are adorned with broad hair bandages that are medially interrupted.

Head: The vertex is ino wider than three times the ocellus diameter.

Thorax: The outer is pur of the hind legs is idark, thick, iand ifeatures ia ishort, almost perpendicularly bent-over tip; the fore coxa has ia ilong, triangular tooth.

Abdomen: iT2-T4 laterally and basally densely punctate, medially sparsely punctate; last tergum features six ispines (Fig. i4); S4 posterior margin is hairless, distinctly sinuate with angular notch-like teeth.

World Distribution *(Warncke, i1992)*

Found in Algeria, North Africa, Europe,and Turkey.

***Coelioxys echinatus* Förster, 1853**

Synonyms:

Coelioxys octodentata Lepeletier, 1841, p. 524-525.

Coelioxys rufocaudata Smith, 1854, p. 260.

Coelioxys echinatus Förster, 1853, p. 279-280.

Female Description (Based ion Warncke, i1992)

Coloration: Antennae and legs dark; apical half of the last abdominal segment red.

Pubescence: Body covered with squamous hairs; mesopleuron sparsely covered with long hairs; tergal bandages long and dense; last tergum hairless.

Thorax: Mesoscutum coarsely punctate, with narrow and shiny interspaces.

Abdomen: T5 base strongly punctate and sparsely punctate towards the apex; T6 apically pointed and elongated; faintly rounded at the base-laterals and sparsely punctured (Figs 1 & 2); S6 tapering apically and narrower than T6.

Male Description

Head: iGenal ifossa iat ifront iedge islightly icarinate iand ishiny; iF2 iless ithan i1.5× ias ilong ias iwide; ivertex iwidth idoes inot iexceed itwice ithe iocellus iwidth.

Thorax: iFore icoxa irounded.

Abdomen: T2 with lateral groove, posteriorly coarsely punctate with a hairless patch; T3 has at most an indistinct transverse groove; S4 posterior margin shallowly dropped and straight; last tergum exhibits a basomedially iarched ilongitudinal carina; last itergum ibears ieight spines (Fig. 2); reduced T7 does not iextend beyond ithe ilast tergum and iis squared medially; S4 is slightly truncated.

World iDistribution (Warncke, i1992)

Documented in Morocco, Algeria, and Turkey.

***Coelioxys elegantula* Alfken, 1934**

Synonyms:

*Coelioxys ielegantula i*Alfken, i1934, ip.180.

Female iDescription:

Body :Length: Total body ilength 9 mm; forewing length 6 mm.

Color: The entire body, including the mandibles and legs, is reddish; the head, mesoscutum, and propodeum are black (Fig. 1); T2–T4 display a blackish tint medially; iwings iare imembranous.

Pubescence: The face is covered with dense, very short whitish hairs; the gena and basal half of the mandibles are adorned with dense, recumbent whitish hairs; the vertex and mesoscutum have sparse, scaly hairs; the mesopleuron, laterally, features long whitish hairs; legs, dorsally, bear very short scaly hairs (Fig. 24); the abdominal terga have a dense whitish scaly fringe at the apex; the abdominal sterna also have an apical fringe of idense scalyhairs, but it is nterrupted medially; S1 possesses a median fringe of scaly hairs.

Head: When viewed dorsally, the head is 1.62× broader than long and i.3× wider than the pronotum; the vertex is densely punctate; the clypeus is slightly convex in the middle, iwith ia itruncate iapical imargin featuring four small spines; the ocellocular distance (OOD) iis 1.1× longer than the nterocellar distance (IOD); eyes are ibare; the malar space is negligible; mandibles are cylindrical and bear ithree sharp teeth; F1 is inarrower at the base and as ilong as F2;F2–F10 iare i1.2× longer than wide.

Thorax: The pronotum is barely visible from ia idorsal iperspective; the iscutum and scutellum exhibit coarse, dense punctation; the scutellum's posterior margin is toothed; a longitudinal median carina is present on the mesoscutum; the scutellum is flat; both the ipronotum iand ithe ianterior face of the mesopleuron are carinate; the forewing features a marginal cell that is four times longer than broad; SMC1 is 1.1× longer than SMC2; the basal vein iis islightly convex and meets vein Cu at an acute angle; the second m-cu vein meets SMC2 sub-apically; the imarginal cell extends beyond the itigma along the costa iand iis three times shorter ihan the stigma (Fig. 25); the stigma is ithree itimes longer ihan wide; the ore coxa has a small, sharp tooth.

Abdomen: orsally arched, longitudinally narrowed itowards ithe itip, 1.6 times iwider than long; isparsely ipunctated iby T1–T4; large punctures; iT5–T6 idensely punctated; smaller punctures than ithe others; T1–T2 depressed imedian groove; 6 depressed laterally having longitudinal median carina (Fig. 23); S6 longer ithan iT6.

Male Description: (after Warncke, 1992)

Head: Vertex inot imore ithan 2× ocell; F2 not more than 1.5× width; glossy genal ifossa

on ianterior margin not thicker than very slightly.

Thorax: The mesoscutum has flat, shiny spaces, each point ibearing a squamous hair; the iposterior margin of the scutellum is rounded; the fore icoxa possesses a small yet distinct tooth at the center.

Abdomen: The posterior margin of T6 features ieight spines; the posterior margin of iS4 ihas a ismall, V-shaped notch medially; T7 is ireduced and does inot project beyond T6, remaining square-shaped in the middle; T2 and iT3 display prominent lateral transverse grooves (Fig. i4).

Local iDistribution:

1♀, collected on i4 September 1953 from Kom Oshim (Fayoum), coll. Ali [ASUS].

World iDistribution:

Recorded in Turkey and Palestine (Warncke, 1992).

***Coelioxys erythrurus* Spinola, i1838**

Synonyms:

Coelioxys erythrurus Spinola, published by Spinola in 1838, pages 532–533.

Coelioxys stolida, described by Nurse in 1903, page i548

Coelioxys indica, introduced by Friese in 1925, pages 32-33

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

Body Length: is about 11 imm.

Color: The first and sixth tergites are predominantly red.

Pubescence: Squamous hairs on the body; T6 ilaterally inarrow iborder; bandages ivery wide, three or four rowsiwide, posterior one longer than anterior.

Thorax: The mesoscutum is densely punctured and features patches of scales, with strong punctures scattered medially; the spaces between punctures are more than one puncture wide, appearing granular and dull; the fore coxa has a rounded upper margin.

Abdomen: The fifth tergite is narrowly constricted at the rear; the sixth tergite is triangular, tapering to ia point at ithe itip, densely and finely punctured, with three longitudinal iridges—one central and two lateral; the lateral half of the apex displays a double bar.

Male Description:

Length: iMeasures between 9.5 and 12 imm.

Color: The body is primarily black, while ithe sixth tergite is red.

Head: Ear-like genal fossa that shines and has hairs bearing minute punctures ion ithe outer margin.

Thorax: The mesoscutum is densely punctured.

Abdomen: The sixth tergite is broad, featuring red sides with long, pointed teeth; it has eight irregular teeth, with the outer four upper teeth being taller than the inner ones; the seventh tergite typically extends into a prominent tip that protrudes below the rear edge of the last tergite.

World iDistribution:

This species is found in Turkey and northern India (Warncke, 1992).

***Coelioxys haemorrhoa* Förster, 1853**

Synonyms:

Coelioxys haemorrhoa Förster, described in 1853 on pages 285-286, has synonyms such as *Coelioxys coturnix* Perez, mentioned in 1884 on pages 278-279, and *Coelioxys ruficaudis* Cameron**,** noted in 1913 on page 122. These synonyms reflect the historical classification of ithis species within the *Coelioxys* genus.

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), egs (except for coxa), tegula, T6 apically, and S6 red (Fig. i30); wing membranous, slightly fumigated apically; wing ivenation ibrown (Fig. i33).

Pubescence: Face and gena covered in short recumbent white hairs; mandible dorso-basally with short scaly white hairs; vertex with sparse white hairs (Fig. i30); mesoscutum iwith sparse yellow short hairs, ibasally iwith tufts of scaly hairs; scutellum basally and posteriorly with scaly white hairs; mesopleuron with dense short iand white scaly ihairs; propodeum with long recumbent inormal white hairs; legs dorsally with dense and short white scaly hairs; anterior surface of T1

Head: In dorsal view 1.2× slightly broader than long and 1.5× wider than pronotum; frons and vertex densely punctate; clypeus slightly convex basally, densely punctate, punctures on clypeus more superficial than elsewhere,

apical margin rounded; ocellocular distance (OOD) 1.25× slightly longer than nterocellar distance (IOD); eyes hairy; malar space neglected; mandible cylindrical with acute three teeth; F1 narrower basally, as long ias F2; F2–F10 i1.25× longer than broad.

Thorax: Pronotum hardly visible from dorsal view; scutum and scutellum coarse and densely punctate; posterior margin of scutellum toothed; pronotum and anterior face of imesopleuron carinate; fore wing with marginal cell 4× longer than broad; SMC1 1.28× longer than SMC2; basal vein roughly convex and meeting vein Cu at an acute angle; 2nd im-cu imeeting SMC2 sub-apically; marginal cell distal to stigma on costa, 3× shorter than stigma; stigma 3× longer than broad (Fig. i33); fore coxa with a small acute tooth.

Abdomen: From the dorsal perspective, the istructure is convex, measuring 1.1× longer ithan iits iwidth. T1 is densely punctate, with a concave iand iimpunctate anterior surface and a itransverse imedian carina. T2 has a flat transverse igroove, while T3 has a lateral groove. T2–T5 are densely punctate basally and isparsely punctate apically. T6 is densely punctate basally with sparse and ifine punctures and sparse, large, and strong punctures apically. iThe iposterior imargin iis tapering medially iand irounded ilaterally (Fig. 32). S2–S5 are idensely ipunctate, iwhile S6 iis densely punctate, with punctures smaller than others, a protruding posterior margin, and a longer posterior margin than T6 .

Male Description:

Body Length: is around 6 mm, with the forewing measuring 5 mm.

Color: The body is predominantly black, while the mandibles, antennae, tegula, legs, and T6 are red (refer to Fig. 29). The scape, mandibular teeth, and coxae have a blackish tint.

Hair Coverage: The face is covered in short, flat white hairs, except for the clypeal disk, which is bare; the gena iand ithe ibase iof the mandible have dense iwhite ihairs (illustrated in iFig. i29). iThe imesoscutum has sparse erect iwhite ihairs at the base, while the mesopleuron and the underside of the femur are covered in dense scaly hairs. The apical margins iof ithe iabdominal iterga have a subtle fringe if scaly hairs, and T6 features a baso-median ispot iof iscaly ihairs (see Fig. 29). The abdominal sterna are covered with scaly hairs, which are interrupted in the middle.

Head: The head is as wide as the pronotum and is 1.4 times broader than it (Pl. VII. Fig. i1). The gena and vertex are coarsely punctured, and the genal fossa is carinate at the base and oval in shape. The malar space is not iprominent, iand ithe ieyes iare ipubescent. The iocellocular idistance i(OOD) is i1.2 itimes greater than the interocellar distance (IOD). The mandible has three acute teeth, with F1 being narrow at the base and slightly longer ithan F2; iF2 ithrough iF10 iare broader than long, while F11 is 1.2 itimes longer than its width.

Thorax: The pronotum is barely visible from above; both the mesoscutum and scutellum are coarsely and densely punctured. The posterior margin of ithe scutellum is truncate and ihas ilateral teeth. The pronotum iand ithe anterior face iof the mesopleuron are carinate. The forewing has a marginal cell that s 2.5 times longer ithan it is wide; SMC1 is 1.5times longer than SMC2. The basal vein is roughly convex and meets the Cu vein at a sharp angle, while the second m-cu ntersects SMC2 iust before the apex. The marginal cell is located distal to the stigma on the costa and s twice as short as the stigma, which is 2.5 times longer than it is wide. ihe fore coxa has a small, sharp tooth.

Abdomen: It appears slightly convex and tapers towards the apex, measuring 1.25 times longer than broad. T1 features a transverse carina and a concave anterior surface. Both T2 and T3 have a transverse median groove. T5 has lateral teeth, while T6 is depressed medially, marked with nine teeth: the lateral teeth are small and triangular, the two median teeth are the smallest, and the two lower teeth are he largest and acute (refer to Fig.31). iT7 is rounded and short beneath T6, and the posterior margin of S4 is emarginated medially, featuring ia smooth edge.

Local Distribution:

2♂, Nasr, Bahnasia (Beni Suef), 13.VIII.2021, coll. A. Hassan; **1**♂, Farafra O. (New Valley), 03.IX.2022, coll. A. Hassan; **1**♂, Kom Oshim (Fayoum), 08.X.2022, coll. A. Hassan; **1**♂, Siwa O. (Marsa Matrouh), 11.IX.2023, coll. A. Hassan; **1**♀, Bahariya O. (Giza), 28.IX.2024, coll. A. Hassan; **2**♀**, 1**♂, Kom Oshim (Fayoum), 12.VIII.2022, coll. A. Hassan; **1**♀**, 2**♂, Anany, Salhya (Sharkia), 9-10.VIII.2022 [Author collection].

World Distribution:

Morocco, Algeria, Spain, Turkey, Tajikistan, Turkmenistan, Uzbekistan (Warncke, 1992).

***Coelioxys haemorrhoa rhodacantha* Cockerell, 1931**

Female Description (After Alfken, 1934)

Length: 7–7.5 mm

Color: Antennae black at the base and distally red; yellowish-brown wing; abdomen color polymorphism—T1 and T6, and occasionally T2, having the color red on T3–T5; also the abdominal tergal spines laterals

Thorax: Mesoscutum maniy with tufts of scaly hairs; mesoscutum and scutellum coarsely wrinkly and dotted, with scaly hairs covering the latter.

Abdomen: T6 medially subapical with a carina; posterior margin rounded.

Male Description

Body Length: 6 mm; Fore Wing Length: 5 mm

Coloration: Body black; mandibles, antennae, tegula, legs, and T6 red; scape, mandibular teeth, and coxa slightly blackish.

Pubescence: The face is covered with short, white hair lying down, except for the bare clypeal disk; gena and basal part of mandibles with dense white hairs; mesoscutum basally with sparse erect white hairs; mesopleuron and ventral femur with dense scaly hairs; abdominal terga with weak fringe of scaly hairs; T6 with basal-median scaly hair spots; abdominal sterna covered with scaly hairs, interrupted medially.

Head: Dorsally as long as broad, 1.4× wider than pronotum; vertex and gena densely punctate; genal fossa oval and carinated basally; ocellocular distance (OOD) 1.2× longer than interocular distance (IOD); mandible with three sharp teeth; F1 narrow basally, slightly longer than F2; F2–F10 slightly broader than long; F11 1.2× longer than broad.

Thorax: Pronotum barely visible dorsally; mesoscutum and scutellum coarsely and densely dotted; scutellum posteriorly truncate and laterally toothed; pronotum and anterior mesopleuron carinate; forewing with marginal cell 2.5× longer than broad; SMC1 1.5× longer than SMC2; basal vein convex, meeting Cu at an acute angle; 2nd m-cu meeting SMC2 subapically; marginal cell distal to stigma on costa, 2× shorter than stigma; stigma 2.5× longer than broad; fore coxa with a small acute tooth.

Abdomen: Slightly convex, tapering apically, 1.25× longer than broad; T1 with transverse carina, anteriorly concave; T2 and T3 with transverse median groove; T5 laterally toothed; T6 depressed medially, with nine teeth (lateral teeth triangular, small, and straight; median two smallest; lower two largest and acute); T7 short and rounded beneath T6; S4 posterior margin emarginated medially, smooth.

Distribution

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

World: Morocco, Spain, Tajikistan, Turkmenistan, Turkiye, Algeria, Uzbekistan ,(Warncke, 1992).

***Coelioxys obtusus* Pérez, 1884**

Synonyms:

Coelioxys obtusus Pérez, 1884, p.279-282.

Coelioxys ruficauda Lepeletier, 1841.

Coelioxys aegypticola Friese, 1925, p.33.

Female Description:

Body Length: 8–8.5 mm; Fore Wing Length: 5.5 imm.

Coloration: Body is black while antennae blackish-brown dorsally, reddish ventrally; imandibles, legs, T6 apically, and abdominal sterna red; tegula and wing ivenation brown; wings fumigated, darker iat ithe apex.

Pubescence: Face covered with short, recumbent pale hairs; vertex sparsely covered with short white hairs (Fig. 38); gena clothed with short, recumbent is now-white hairs; imandible base with short white hairs, apico dorsally with isparse ilong yellow hairs. The imesoscutum ihas isparse, scaly white hairs iat the base iand laterally, while the scutellum features two basal itufts of scaly white ihairs. The itegula iis basally covered with long, recumbent iwhite ihairs. Mesopleuron, ventral femur, dorsal itibia, and ibasal itarsal segments are densely clothed with snow-white hairs; tarsus ventrally has yellow hairs; tibial spurs are yellow. Abdominal terga ihave white bands, denser and ithicker laterally; abdominal sterna ipossess broad bands, which narrow medially.

Head: In dorsal view, 1.1× broader than long and 1.3× wider than the pronotum; frons and vertex densely ipunctate (Fig. i38); clypeus slightly convex basally; eyes hairy; ocellocular distance i(OOD) is 1.6× slightly longer than the iinterocellar distance (IOD); malar space neglected; mandible cylindrical with three

acute iteeth. F1 is narrower at the base and slightly longer than F2; F2–F10 are as long as broad; F10 is 1.25× longer than broad.

Thorax: Pronotum barely visible from the dorsal view; scutum and scutellum ihiny and densely punctate; posterior margin of the scutellum toothed; pronotum and anterior face iof the mesopleuron carinate. Fore wing marginal cell is 4× longer than broad; SMC1 is 1.1× longer than SMC2. The basal vein is slightly convex and meets vein Cu at an acute angle; the second m-cu vein meets SMC2 sub-apically. The marginal cell s distal to the stigma on the costa and is 2× shorter than the stigma; the stigma is 2.5× longer than broad. The fore coxa is rounded with a ivery fine angle.

Abdomen: Convex in dorsal view, 1.6× longer than broad. T1 is densely punctate, its anterior isurface concave and iimpunctate with a transverse median carina. T2–T4 have a flat itransverse igroove. iT2–T5 are densely punctate ibasally and sparsely punctate apically. T6 is convex basally with dense ifine punctures and coarse punctation apically (large and strong punctures), medio-apically featuring a small longitudinal carina. The posterior margin tapers and is truncate medially (Fig. i37). S2–S5 are sparsely punctate; S6 ihas iparallel sides, is densely punctate with smaller punctures than other segments, and has a posterior margin that protrudes and extends longer than T6.

Male Description:

Body iLength: i7.5 imm; iFore iWing iLength: i4.5 imm.

Coloration: Head (including scape, pedicel, and F1), thorax (including fore coxa), and iT1–T4 are black (Fig. i34). The flagellum, mandible, T5–T6, and abdominal sterna are red; tegula brown; wing venation brown; wings slightly fumigated with a metallic sheen.

Pubescence: Face and clypeus are clothed with long, recumbent white hairs; vertex sparsely icovered iwith scaly hairs (Fig. i35); gena and mandible ibase clothed with short, recumbent white hairs. iThe mesoscutum is sparsely covered with scaly hairs at the base iand ilaterally; the scutellum has a basal fringe of iscaly hairs; the imesopleuron iand ventral femur are covered in dense snow-white scaly hairs. Tibia dorsally and the basal tarsal isegment are iclothed iwith iscaly hairs. Abdominal terga iand sterna resemble the female; T6 is laterally surrounded by scaly hairs.

Head: In dorsal view, slightly longer than broad and 1.3× wider than he pronotum. Frons and ivertex iare sparsely punctate; clypeus slightly convex ibasally; ieyes ihairy (Fig. i35). Ocellocular distance (OOD) iis 1.7× slightly longer than ithe interocellar distance (IOD); malar space neglected. The mandible is cylindrical with ithree acute teeth. F1 is narrower at the base and slightly longer than F2; F2–F10 are slightly ibroader than long; F11 is 1.25× longer than broad.

Thorax: As in the female.

Abdomen: Slightly convex, tapering apically, 1.4× longer than broad. T1 features ia transverse carina iand ia iconcave anterior surface. T2, T3, iand iT4 ihave ia transverse median groove. T5 has a lateral groove and is depressed sub-apically; T5 is laterally toothed. T6 is medially depressed with eight teeth: lateral teeth iare triangular, small, and dull; the imedian two teeth resemble a carina; the lower two teeth iare the largest (Fig. i36).

Local iDistribution:

1♂, 1♀, Hurghada (Red iSea), 20.IV.2024, coll. N. Gadallah [Author Collection].

World iDistribution:

Recorded in Morocco, Italy, and Turkey (Warncke, 1992).

***Coelioxys rufispina*Walker, 1871**

Synonyms:

Coelioxys rufispina Walker, 1871

Coelioxys afra var. *intacta Friese, 1922*

Female Description:

Body Length: 9 mm; Forewing: 5 imm.

Color: Body, including antennal scape, black (Fig. 41); mandibles, iantennae, tegulae, apical ipart iof iT6, iS5, iand iS6 ired.

Pubescence: Face covered with long, recumbent white hairs except supra-clypeal area bare (Fig. 41); gena with short, recumbent iwhite ihairs; mesoscutum with lateral tufts of scaly hairs; mesopleuron covered with scaly hairs; propodeum with long white hairs; posterior margin of abdominal iterga with iweak ifringe iof iscaly hairs, dense laterally (Fig. 39); abdominal sterna with scaly hairs, bare medially.

Head: In dorsal view 1.3× slightly broader than iong and 1.4× wider than

pronotum;ivertex coarsely and densely punctate (Pl. XI. iig. 2); clypeus slightly convex medially, densely punctate, apical margin rounded; iocellocular idistance (OOD) as long as iinterocellar idistance i(IOD); ieyes hairy; malar space indistinct; mandible cylindrical with three acute iteeth; iF1 narrower basally, as long ias F2; F2–F9 1.25× wider than long; F10 slightly longer than broad.

Thorax: Pronotum barely visible in dorsal view; scutum and scutellum coarsely and densely punctate; iposterior margin of scutellum rounded, toothed laterally; pronotum and anterior face of mesopleuron icarinate; forewing iwith imarginal cell 5× longer than broad; SMC1 1.4× longer than SMC2; basal vein roughly convex, meeting vein Cu at an acute angle; 2nd m-cu meeting SMC2 subapically; marginal cell distal to stigma on costa, 2.5× shorter than stigma; stigma 2.6× longer than broad (Fig. 44); fore coxa with a small, acute tooth.

Abdomen: Convex in dorsal view, 1.4× longer than broad; T1 densely punctate, anterior surface concave and impunctate, with transverse median carina; T2 iand iT3 with median groove; T2–T5 idensely punctate basally, isparsely punctate apically, apical punctures ilarger; T6 iconvex, ibasally with sparse and large punctures, finer apically; posterior margin iof iT6 icarinate laterally (Fig. i39); S2–S5 densely punctate; S6 densely punctate iwith ismaller ipunctures than other sterna, posterior margin protruding and longer than iT6.

Male Description:

Body Length: 8 imm; Forewing: 5.5 mm.

Color: Body black; antennae, mandibles, tegulae, legs, andT6 red (Fig. i40). Pubescence**:** Face covered with short, recumbent white hairs; gena and basal part of mandibles with white hairs; mesoscutum with lateral tufts of white scaly hairs; mesopleuron covered with scaly hairs; posterior imargin iof abdominal terga with weak fringe of white hairs, iinterrupted medially and dense laterally; abdominal sterna with white scaly hairs, interrupted medially.

Head: In dorsal view, as long as broad and 1.1× wider ithan ipronotum; ivertex iand gena coarsely and densely punctate (Fig. 43); igenal ifossa isemi-rounded, carinate basally; malar ispace iindistinct; ieyes hairy; ocellocular distance i(OOD) 1.25× slightly longer than nterocellar distance (IOD); mandible with dull three teeth; F1 narrow basally, slightly longer than F2; F2–F10 as long as wide; F11 1.5× longer than broad.

Thorax: As in female.

Abdomen: Slightly convex, 1.1× longer thanbroad; T1 with itransverse icarina, anterior surface concave; iT2 iand T3 with basal transverse imedian igroove; T4 and T5 laterally grooved; T5 itoothed ilaterally; T6 depressed medially, with 9 teeth (lateral teeth triangular, small, and straight; median two teeth smallest; lower two iteeth ilargest; a ismall tooth present between ithe itwo groups) (Fig. 42); T7 rounded, short, beneath T6; iposterior margin of S4 complete.

Local iDistribution:

1♂, Pyramid (Giza), 9.VII.1953, coll. Ali; **1**♂, iGabal iAsfar i(Cairo), i8.VII.1953; **1**♂, Kom Oshim (Fayoum), i01. VIII.1953, coll. Ali; **1**♂, Fayoum, i5. iV.1952, icoll. S.L.M; **1**♀, Mansouria i(Giza), i23.IV.1953; **1**♀, iPyramid (Giza), 12.VII.1953, icoll. Ali; **1**♀, Kom Oshim (Fayoum),i4.IX.1953 [ASUA].

Subgenus Liothyrapis

Coelioxys decipiens , 1838

Synonyms:

The synonyms for Coelioxys decipiens, 1838, include several alternative names that have emerged over time. One historical alternative is *Coelioxys decipines* Spinol**,** also dated to 1838. Another notable synonym is *Coelioxys farinose***,** which was described by Smith in 1854. These various names reflect the complexities in the taxonomy of this species.

Female Description:

(After Alfken 1934, Nadimi et al. 2013, and Klaus 1992)

Body Length: measure between 9 to 12 mm n length.

Pubescence: The Body is black with a dusty surface due to fine, dense gray hairs. Posterior margins of T1–T5 with fine fringes, wide sideways.

Head: F1 more than semi the length of F2.

Abdomen: T6 covered with soft hairs, almost without sculpture. Summit ,it bears sharp teeth and is Widely round with some bristles. S6 is broad, rectangular shape, and pointed apicallys.

Male Description:

Body Size: Males are slightly smaller, ranging from 8 to 11 mm in length, with forewings measuring between 4 and 6 mm.

Coloration: The body, included the scape, pedicel, mandibles, and legs (except the fore and mid-tarsus), is glossy black. The flagellum, tegula, and fore and mid-tarsus exhibit a reddish-brown hue (Fig. 45). Tibial spurs and wing veins appear brown, while the wing membrane is faintly tinted at the tips.

Pubescence: The face, clypeus, and gena are covered with long white hair, while the base of the mandibles bears short white hairs (Fig. 46). The mesopleuron and the underside of the femur feature long white hairs. Abdominal terga are adorned with white bands, which are more fragmented medially (Fig. 47). The abdominal sterna are densely covered with long white hairs, forming distinct apical bands. The underside of the fore tarsus has yellow setae, whereas the mid and hind tarsi bear pale setae. All hairs are of the standard type, with no scaly texture.

Head: From a dorsal perspective, the head is 1.3× longer than broad and 1.25× wider than the pronotum (Pl. XII, Fig. 1). The frons is densely punctate, whereas the vertex has fewer but larger punctures. The gena are sparsely punctate, marked by large and shallow impressions. The genal fossa is elongated, and the peristomal space is indistinct. The eyes are bare, with the ocellocular distance equal to the interocellar distance. The mandibles possess three small teeth. F1 is narrow at the base and only slightly longer than F2. F2–F10 are marginally longer than wide, while F11 is flattened and measures 1.3× longer than broad.

Thorax: The pronotum is barely visible from the dorsal view. The scutum and scutellum exhibit coarse, deep punctation, while the posterior margin of the scutellum protrudes slightly at the center (Fig. 45). Both the pronotum and the anterior face of the mesopleuron are ridged. The forewing's marginal cell is 3.5× longer than wide. SMC1 is 1.3× longer than SMC2. The basal vein is slightly curved and meets vein Cu at an acute angle. The second m-cu vein joins SMC2 near its apex. The marginal cell extends along the costa and is 2.5× shorter than the stigma. The stigma itself is 2.8× longer than wide. The fore coxa is equipped with a long, triangular tooth.

Abdomen: It is robust, slightly elevated, and approximately 3.25× longer than broad. T1 features a transverse ridge, with its anterior surface concave. T2 presents a transverse median groove, while T3, T4, and T5 display lateral grooves. T5 lacks lateral teeth (Fig. 47). T6 is flattened at the center and bears six elongated, pointed teeth, with an additional small tooth in the middle of the central notch (Fig. 48). T7 is rounded and remains short beneath T6. All terga are densely punctate with fine markings. The posterior margin of S4 exhibits a broad notch.

Local Distribution:

4♂ specimens collected from Alsadt, Ashmon (Monofya) on 5 May 2024 by A. Hassan.

1♂ specimen collected from K. Hamam (Sharkia) on 07. VI 2022by A. Hassan [author collection].

World Distribution:

Reported in Morocco, Turkey, Tajikistan, and Turkmenistan (Warncke, 1992).

CONCLUSION

This research includes ten species of the genus *Coelioxys* found in Egypt, where a complete study was made that includes these species, as they are insect pollinators that parasitize their genus and other species. Therefore, this study had to be conducted to confirm their presence in the Egyptian fauna or not, as they are threatened with extinction due to encroachment on agricultural lands, excavation of concrete and waterways, and as a result of environmental change, extinction, and migration of some species. Therefore, it was necessary to make an inventory and division of these species under study, as it was found that some species existed and others disappeared.

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Table 1. Collection sites, dates, and plant hosts

Species	Country	Lat/longs	Date	Host
Coelioxy's afra Lepeletier, 1841	Barkash (Giza)	30°09′50″N; 31°01′29″E	5.VI.1952	*Lupinus*
	Kom Oshim (Fayoum)	29°34′00″N; 30°55′00″E	04. VIII.1953	*Trifolium alexandrinum*
Coelioxys elegantula Alfken, 1934	Kom Oshim(Fayoum)	29°34′00″N; 30°55′00″E	4.IX. 1953	*Trifolium alexandrinum*
Coelioxys haemorrhoa Förster, 1853	Bahnasia (Beni Sewaif)	29°04′59″N; 31°05′47″E	13.VIII.2021	*Petroselinum crispum*
	Farafra O.(New Vally)	27° 3'24.25"N, 27°58'13.07"E	03. IX.2022	*wild plant*
	Kom Oshim(Fayoum)	29°34′00″N; 30°55′00″E	08.IX.2022	*Trifolium alexandrinum*
	Siwa O.(Marsa Matrouh)	29°12'11"N; 29°12′11″N	11.1X.2023	*Ocimum basilicum*
	Baharia O. (Giza)	28°23′06″N; 28°54′27″E	28.IX.2024	*Medicago sativa*
	Salhya (Sharkia)	30°11'29"N; 31°23'55"E	12.VIII.2022	*Lupinus*
Coelioxys haemorrhoa rhodacantha Cockerell, 1931	Gabal asfar (Qalyoubia)	30°11'29"N; 31°23′55″E	30.V.1956	*wild plant*
	Mansouriah(Giza)	30°08′10″N; 31°04′25″E	23.IV.1954	*Lupinus*
Coelioxys obtusus Pérez, 1884	Harghada (Red sea)	27°15′28.42"N 33°48'41.78"E	20.IV.2024	*Ocimum basilicum*
Coalioxys rufispina Walker, 1871	Pyramid (Giza)	29°58'38"N; 31° 08′13″E	9.VII. 1953	*Trifolium alexandrinum*
	Gabal asfar (Qalyoubia)	30°11'29"N; 31°23′55″E	8.VII.1953	*Malus domestica*
	Kom Oshim(Fayoum)	29°34′00″N, 30°55′00″E	01.VIII.1953	*Lupinus*
	Mansouriah(Giza)	30°08′10″N, 31°04′25″E	12.VII.1953	*Brassica*
Coelioxys decipiens Spinola, 1838	Sadat (Monofya)	30°21′41″N: 30°55′26′E	5.V. 2024	*Solanum melongena*
	K.Hamam (Sharkia)	30°36′42.60″N 31°30′39.99"E	07.IV.2022	*Brassica sp*
Coelioxys conoidea Illiger 1806'	Mansouriah(Giza)	30°08′10″N, 31°04′25″E	26-vii-2022	*clay nest*
Coelioxys echinatus Förster, 1853	(Sharkia)	30°36′42.60″N	7.V.2021	*Trifolium alexandrinum*
Coelioxys erythrurus Spinola, 1838	ASWAN	29°58'38"N; 31° 08′13″E	12.VII.1952	*Medicago sativa*
	Fayoum Pyramid	29°34′00″N, 30°55′00″E	09.VIII.1953	Ocimum basilicum

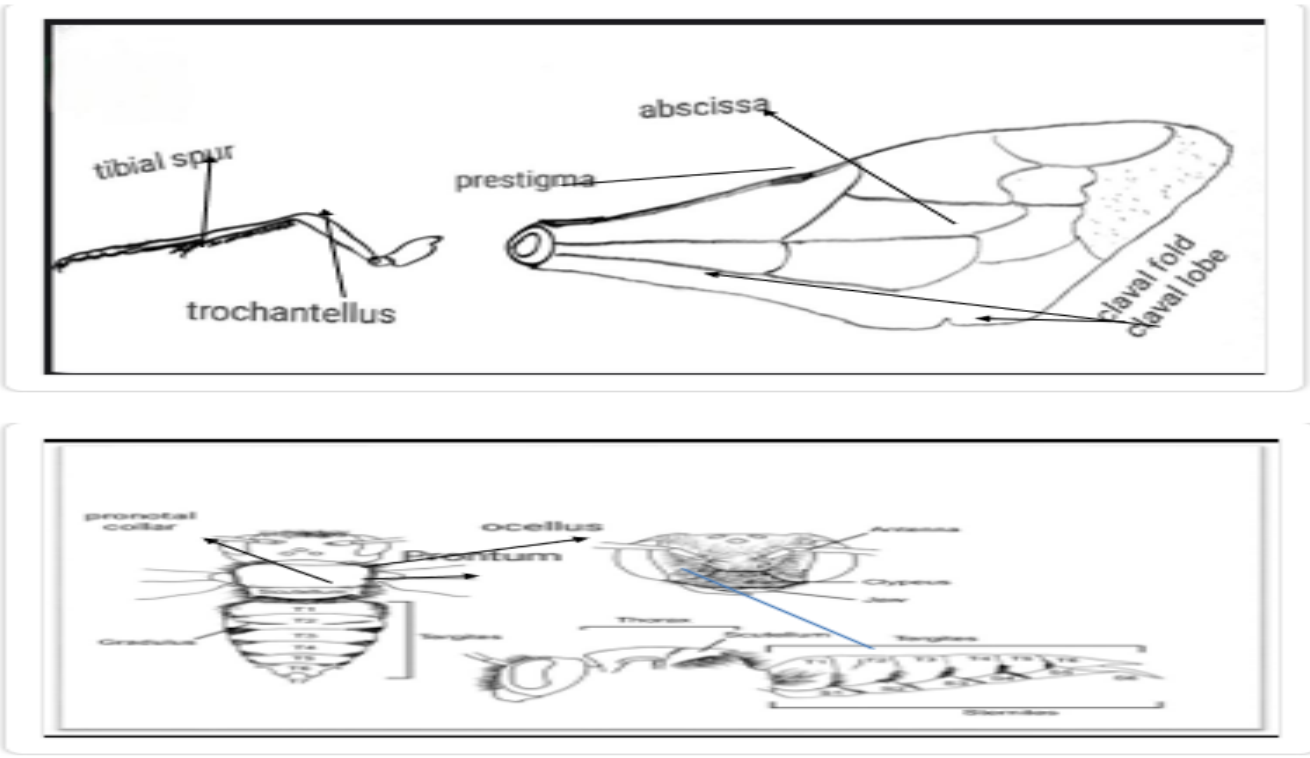
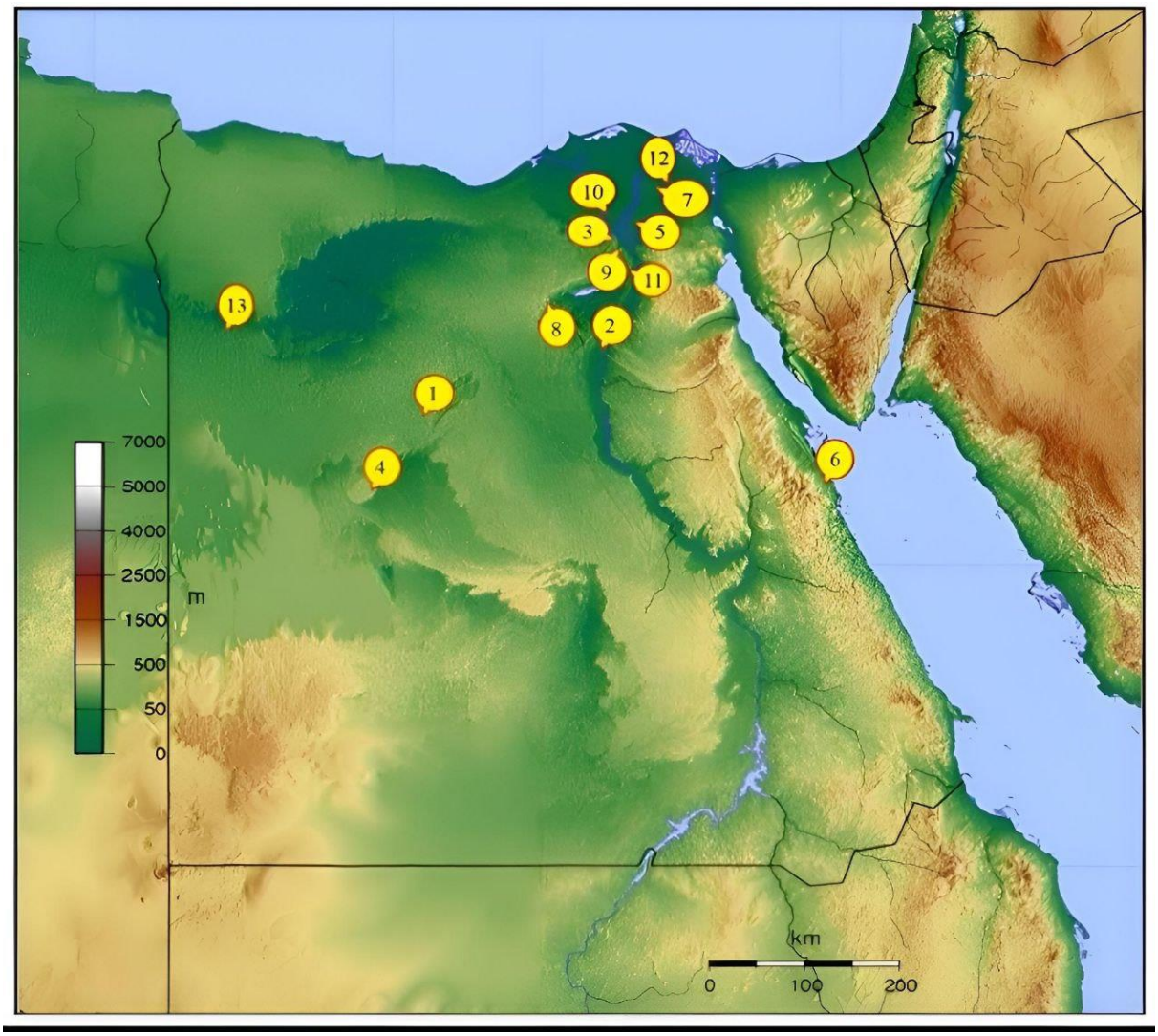


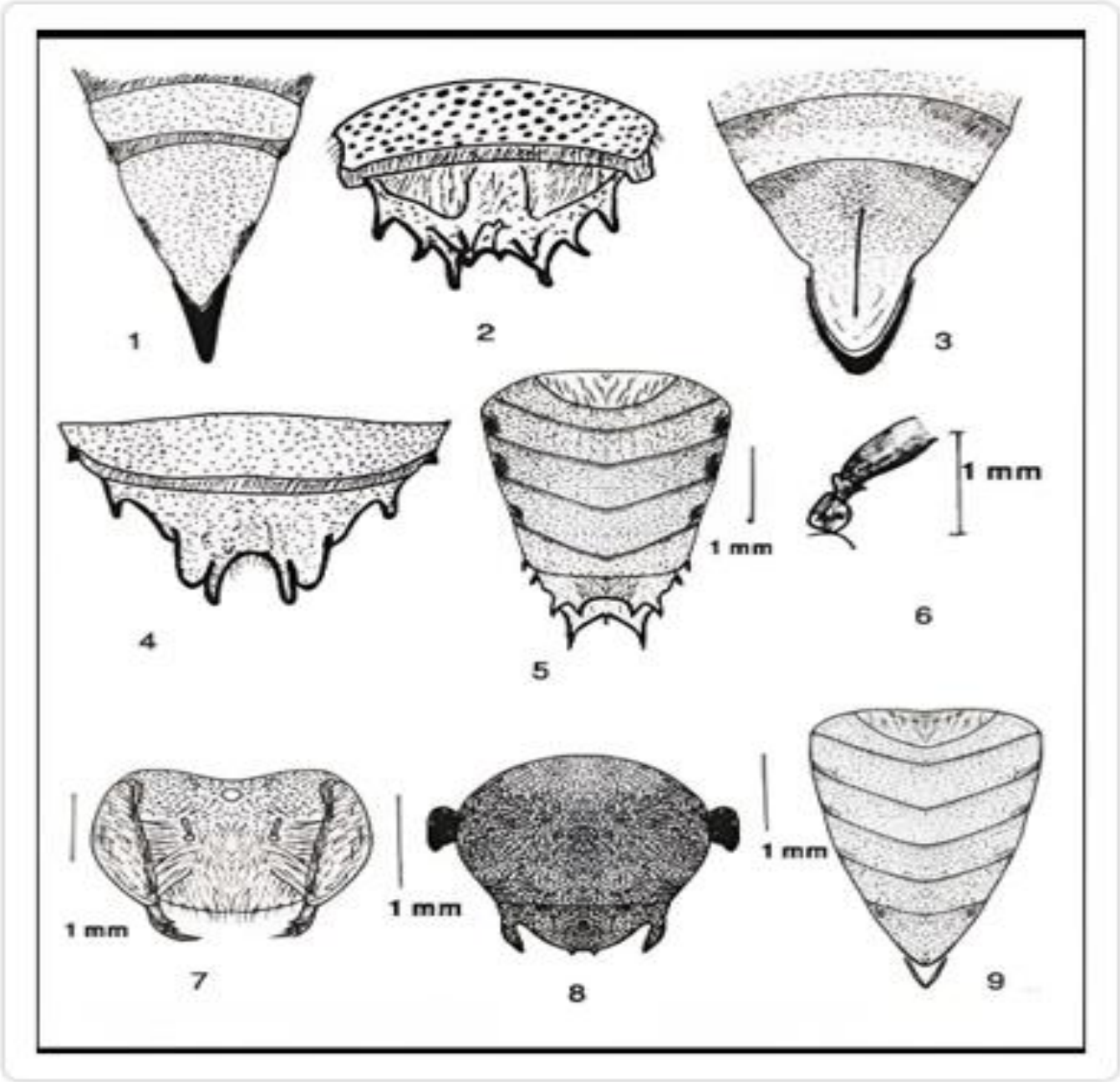
Illustration of body parts genus: *Coelioxys*



Map 1 illustrates the collecting localities for Coelioxys specimens within Egypt. The specific sites include:

1. Baharia Oasis (Giza)
2. Bahnasia (Beni Sewaif)
3. Barkash (Giza)
4. Farafra Oasis (New Valley)
5. Gabalasfar (Qalyoubia)
6. Hurghada (Red Sea)
7. Kafer Hamam (Sharkia)
8. Kom Oshim (Fayoum)
9. Mansouriah (Giza)
10. Sadat (Monufya)
11. Pyramid (Giza)
12. Salhya (Sharkia)
13. Siwa Oasis (Matrouh)

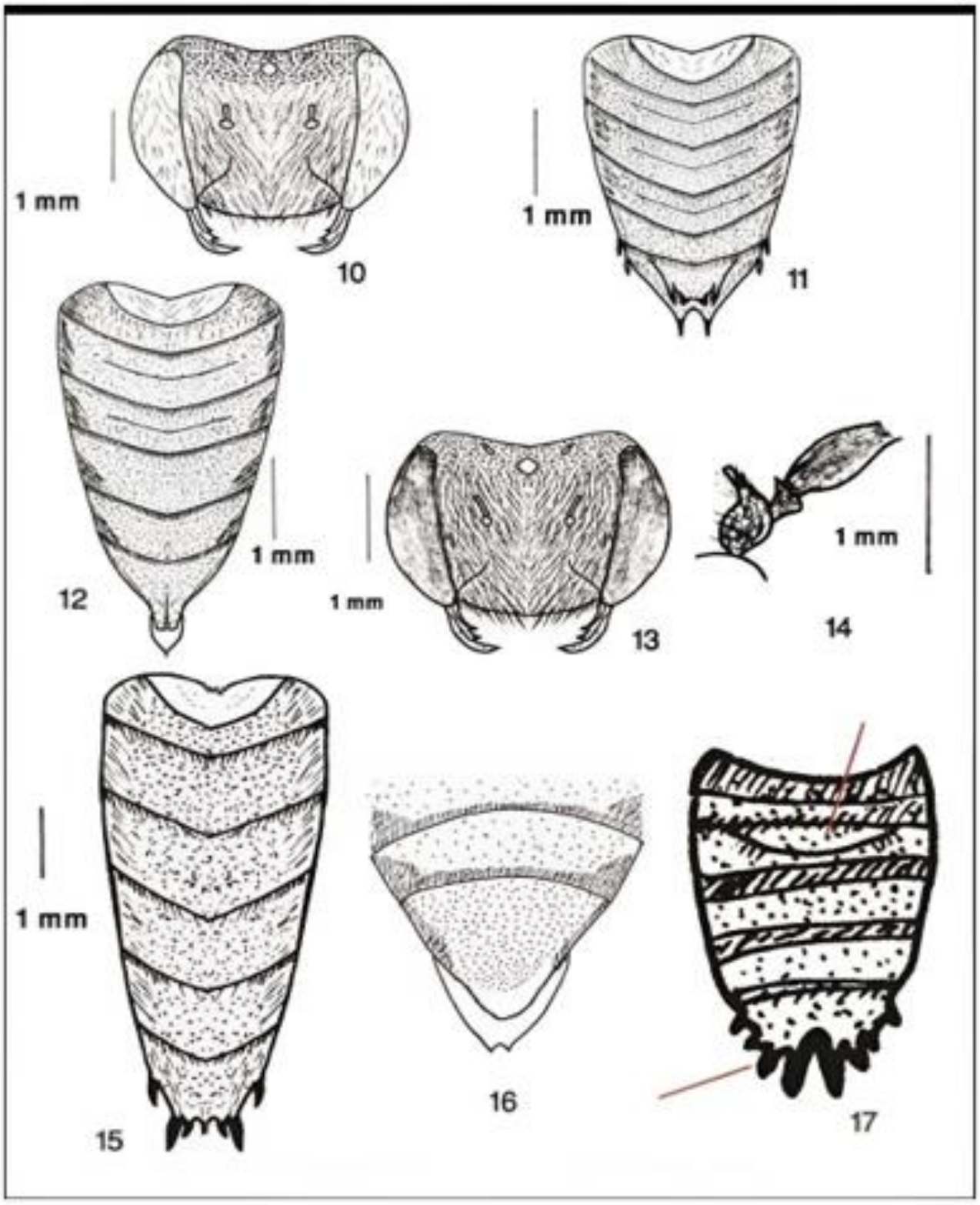
These localities represent the diverse habitats from which the specimens were collected, highlighting the geographic distribution of the *Coelioxys* genus in Egypt.



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*** **Illiger1806**: 3. T6♀; 4. T6 ♂ (dorsalview). (after Ortiz-Sanchez *et al*,2009).

Figs. 5-9: ***Coelioxys haemorrhoa*** **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 haemorrhoa rhodacantha*** **Cockerell, 1931**: 26. Fore wing; 27.. Head and thorax (dorsal view), 28. Abdomen (dorsal view).

Figs.39-44. ***Coelioxys ruficspina*** **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).

F:49,50 Coelioxys decipiens: head in frontal view

حصر ودراسات قسيمية على النحل الطفيلي من جنس *الكوليليوكسيس* (غشائية الأجنحة: ميجاكيليدي) في مصر.

عبدالحكم عبداللطيف الصعيدى،شريف فاروق محمد حافظ ،محمد كامل عامر عبيد، أحمد حسن عبدالعال *

قسم وقاية النبات ، كلية الزراعة، جامعة الأزهر, القاهرة, مصر.

* البريد الإليكتروني للباحث الرئيسي: ahmedhassan95@azhar.edu.eg

الملخص العربي:

تشمل هذه المجموعة جنس (الكوليليوكسيس)، المعروف باسم نحل الوقواق، والذي يُظهر سلوكيات طفيلية مثيرة للاهتمام. تعتمد يرقات الكوليليوكسيس على الغذاء المسروق من النحل القاطع للأوراق، وخاصة يرقات (ميجاكيل لاتريل) .والجدير بالذكر أن ظهور بيضة (الكوليليوكسيس)، يحدث قبل ظهور بيضة (ميجاكيل)، مما يسمح لليرقات الصغيرة باستخدام فكوكها القوية لفصل بيضة (ميجاكيل)، وبالتالي ضمان بقائها على قيد الحياة. يضم جنس (الكوليليوكسيس)، حوالي 500 نوع، مقسمة إلى 15 جنسًا حول العالم. يُظهر هذا النحل نمط حياة طفيلي، حيث يضع بيضه داخل أعشاش نحل بري آخر، غالبًا من نفس الجنس أو أجناس قريبة منه، وخاصة(ميجاكيل)، لذلك، كان من الضروري إجراء جرد شامل لتحديد الأنواع الموجودة في مصر. تم ذلك على النحو التالي: أُجري في مصر جرد ومراجعة شاملة لجنس (ميجاكيل لاتريل)، الذي ينتمي إلى فصيلة (ميجاكيليدي)، والفصيلة الفرعية (ابويديا)، ورتبة (غشائية الاجنحة). تستند هذه الدراسة إلى العينات التى جُمعت ميدانيًا في مصر بين عامي 2021 و2024، ووُصفت لأول مرة عام 1809. أُدرجت الأنواع المحددة ضمن مجموعات الحشرات المرجعية في الجامعات ومؤسسات البحث العلمي. وُصفت هذه الأنواع، ووُضِّحت خصائصها المورفولوجية، وسماتها التصنيفية. ووُضِع مفتاح تصنيفي للتمييز بين الذكور والإناث المسجلة في مصر. تم حتى الآن توثيق تسعة أنواع ونوع فرعي واحد في مصر: (كوليليوكسيس أفرا، كوليليوكسيس كونوديا ، الكوليليوكسيس إكيناتوس ، كوليليوكسيس إليجانتولا ، كوليليوكسيس إريثروروس ، كوليليوكسيس هيموروا ، كوليليوكسيس هيموروا الروداكانثا ، كوليليوكسيس أوبتوسوس ، كوليليوكسيس روفيسبينا) ، ونوع فرعي واحد، (كوليليوكسيس ديسيبينز).

الكلمات الاسترشادية: تصنيف الملقحات، مورفولوجيا الحشرات، التفاعلات الطفيلية، تقييم التنوع البيولوجي.