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# **A new *Andrena* (*Planiandrena*) species from Central Asia (Hymenoptera, Andrenidae)**

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**A b s t r a c t :** *Andrena* is the second largest genus of bees, and is diversified across Mediterranean, temperate, and xeric climates, including large parts of Central Asia. The *Andrena* fauna of Central Asia is incompletely known due to its vast size, and new searches have revealed a new species of *Andrena* (*Planiandrena*), a species-poor subgenus found from the Middle East to Central Asia. *Andrena* (*Planiandrena*) *aequinoctialis* nov.sp. is described from south-eastern Kazakhstan where it is associated with early-flowering *Gagea bulbifera* (Liliaceae). A new identification key to members of the subgenus is presented, as it has now expanded to nine species from its original four. This finding illustrates the need for additional surveys during the early season in Central Asia to more fully characterise the *Andrena* fauna present in this region.

**K e y w o r d s :** alpha taxonomy, Kazakhstan, steppe, Liliaceae, solitary bees

## **Introduction**

*Andrena* is the second largest genus of bees, with 1,738 species counted in the most recent update (WOOD 2025). It is particularly diversified in areas with Mediterranean, warm temperate, or seasonally xeric climates. This includes most of Central Asia, where the *Andrena* fauna is known to be collectively large but individual areas or regions often have only moderate species diversity. The *Andrena* fauna across Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan, and Kyrgyzstan numbers around 250 species, which is only slightly more than can be found in either Spain or Greece (WOOD 2023a; WOOD, unpublished data). It is important to note that the Central Asian *Andrena* fauna is only partially revised (OSYTSHNJUK et al. 2005, 2008), and new species are actively being described from this region (e.g. WOOD 2023b, 2025).

The primary worker of the Central Asian *Andrena* fauna during the 20<sup>th</sup> century was Anna Osytsnjuk (BANASZAK et al. 1999). She described both species and new subgenera that have largely been supported by modern phylogenetic data (PISANTY et al. 2022a). One such subgenus is *Andrena* (*Planiandrena*) OSYTSHNJUK, 1983 that was described based on four species from Kazakhstan, Uzbekistan, and Turkmenistan (OSYTSHNJUK 1983). Subsequent research has produced a further four species of *Andrena* (*Planiandrena*), specifically *A. flagrans* WOOD, 2022 (southern Iran), *A. huma* WOOD & MONFARED, 2022 (Israel, Syria, and Iran), *A. sella* WOOD, 2022 (southern Iran), and *A. veterana* PISANTY, 2022 (Israel, Lebanon, and Iraq) (PISANTY et al. 2022b, WOOD & MONFARED 2022, WOOD et al. 2024). This substantially broadened the overall distribution of the subgenus, with it now extending from the Anti-Lebanon mountains (Mount Hermon) to northern Iraq, Iran (Zagros mountains, central Iran, Kopet Dag), and Central Asia.



**Figs 1-2:** Steppe grassland 5 km NW of Tamgaly on 21 March 2025: (1) general view; (2) grassland closeup, with flowering *Gagea bulbifera* (Liliaceae).

A recent expedition to south-eastern Kazakhstan afforded the opportunity to visit steppe grassland (Fig. 1) early in the season – earlier than most previous expeditions to the region. This visit on 21<sup>st</sup> March 2025 encountered grassland with abundant *Gagea bulbifera* (Liliaceae) in bloom (Fig. 2). *Tulipa* sp. (Liliaceae) and *Iris kuschakewiczii* (Iridaceae) were also flowering, but were much less common. Searches on *G. bulbifera* produced a new ninth species of *Andrena* (*Planiandrena*) that does not match any of the species described by Osytshnjuk. We take the opportunity to describe this new species, and also to illustrate some type material for *A. arenata* OSYTSHNJUK, 1983 and *A. tobiassi* OSYTSHNJUK, 1983, as neither of these *Andrena* (*Planiandrena*) species have yet featured in an illustrated type catalogue (ASTAFUROVA et al. 2022, 2024). The finding illustrates the need for early searches in Central Asian regions to fully characterise the diversity of *Andrena* that are well-known for their love of cooler temperatures and cool-weather flowers (HERRERA & ALONSO 2023).

## Material and measurements

Morphological terminology follows MICHENER (2007), with the exception of the marginal "zones" of the terga, which are referred to as marginal "areas". The following abbreviations are used in the species descriptions: A = antennal segments, S = metasomal sterna, and T = metasomal terga. Specimens were measured from the centre of the clypeus at the front of the head to the apical tip of the metasoma to the nearest 0.5 mm. Photographs were taken using an Olympus E-M1 Mark II with a 60 mm macro lens. Additional close-ups were taken with the addition of a Mitutoyo M Plan Apo 5X infinity corrected objective lens. Photographs were stacked using Helicon Focus B (HeliconSoft, Ukraine) and plates were prepared in GNU Image Manipulation Program (GIMP) 2.10. Post-processing of some images was made in Photoshop Elements (Adobe Systems, USA) in order to improve lighting to highlight specific characters. For species distributions, countries marked with an "\*" indicate the first published record for that country.

## Taxonomy

### *Andrena (Planiandrena) aequinoctialis* nov.sp. (Figs 3-10)

**Material examined:** Holotype: KAZAKHSTAN: Almaty, 5 km NW of Tamgaly [43.8389°N, 75.4870°E], 21.iii.2025, 1♀, leg. J. Schmerbach, coll. Biodiversitätszentrum Linz (Oberösterreichisches Landesmuseum Linz, OLML); Paratypes: KAZAKHSTAN: same information as holotype, 1♂, 1♀, coll. Biodiversitätszentrum Linz (Oberösterreichisches Landesmuseum Linz, OLML).

**Diagnosis:** *Andrena aequinoctialis* can be recognised as a *Andrena (Planiandrena)* due to the broad process of the labrum (3 times wider than long), narrow facial foveae (dorsally occupying only  $\frac{1}{3}$  of the space between the compound eye and lateral ocellus), broad and finely shagreened propodeal triangle with weakly indicated lateral margins, hind tibial spur that is slightly broadened submedially, long A3 which equals A4+5+6 in the female sex, and pygidial plate with slightly raised central area.

In the female sex, it is superficially similar to *A. tobiasi* (central and western Kazakhstan) due to the apical rims of the tergal margins which are broadly lightened hyaline-yellow. However, the sculpture of the clypeus is completely different; in *A. tobiasi*, the clypeus is flattened and strongly polished and shining over the majority of its surface, with punctures separated by 2-5 puncture diameters. In *A. aequinoctialis*, the surface is weakly domed and densely punctate, with punctures separated by <0.5-0.5 puncture diameters, with a prominent longitudinal impunctate midline. It is this clypeal sculpturing combined with the largely microreticulate and dull scutellum that allows separation from all other described *Andrena (Planiandrena)* species; this is integrated into the identification key below.

In the male sex, diagnosis is only partial, since four *Andrena (Planiandrena)* species are known only in the female sex. For known males, *A. aequinoctialis* can be compared to *A. tobiasi* and *A. veterana* (Israel, Lebanon, Iraq) due to the genital morphology which has the inner margin of the gonostyli showing a conspicuous bulge, the inner and outer margins thus not parallel combined with the penis valves which are basally broadened at the point of contact with the gonocoxal teeth. As the gonocoxal teeth are long and

rounded (acutely pointed in *A. tobiasi*, strongly and abruptly truncate in *A. veterana*) and the clypeus is yellow only in a narrow zone along the apical margin (entirely dark in *A. tobiasi*, predominantly yellow in *A. veterana*), *A. aequinoctialis* can be swiftly recognised.

**Description:** Female. Body length: 8-9 mm (Fig. 3). Head: Dark, 1.3 times wider than long (Fig. 4). Clypeus weakly domed, densely punctate, punctures separated by  $<0.5$ – $0.5$  puncture diameters with exception of broad impunctate longitudinal midline; underlying surface polished and shining. Process of labrum rounded rectangular, 3 times wider than long. Malar space linear. Gena slightly exceeding width of compound eye; ocelloccipital distance slightly  $< \frac{1}{2}$  diameter of lateral ocellus. Foveae dorsally occupy  $\frac{1}{3}$  space between compound eye and lateral ocellus, slightly narrowing below, ventrally extending to level of antennal insertions; foveae filled with brown hairs. Head covered with whitish to light brownish hairs, hairs not equalling length of scape. Antennae dark basally, A4-13 ventrally lightened by presence of greyish scales; A3 equalling A4+5+6.

Mesosoma: Scutum finely microreticulate, laterally dull, medially with small area showing reduced sculpture, weakly shining (Fig. 5). Scutellum microreticulate, dull. Scutum and scutellum irregularly punctate, punctures separated by 0.5-2 puncture diameters. Pronotum rounded. Mesepisternum and dorsolateral parts of propodeum with fine granular microreticulation, dull. Propodeal triangle broad, laterally not defined by carinae, internal surface with finer granular shagreen, basally with short elevated rugae, propodeal triangle thus defined by change in surface sculpture. Mesepisternum with long whitish to light brown hairs, becoming slightly shorter on scutum and scutellum. Propodeal corbícula incomplete, dorsal fringe composed of light brown plumose hairs, internal surface with scattered simple hairs. Legs dark, apical tarsal segments reddish-brown, pubescence light brown. Flocculus complete, composed of pale plumose hairs; femoral and tibial scopae composed of simple silvery hairs. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation dark orange, nervulus interstitial.

Metasoma: Tergal discs dark, marginal areas with apical rims lightened hyaline-brown, width of colouration equalling 2 times diameter of lateral ocellus (Fig. 6). Tergal discs with fine shagreen, weakly shining, surface with scattered fine hair-bearing punctures, punctures separated by 3-4 puncture diameters. Tergal discs with long pale hairs, not obscuring underlying surface; marginal areas of T2-4 with dense hairbands, slightly extending onto disc of subsequent tergum. Apical fringe of T5 and hairs flanking pygidial plate golden brown. Pygidial plate rounded-triangular, medially with elevated triangular area, surface impunctate, dull.

Male. Body length: 8 mm. Head: Dark, 1.3 times wider than long (Fig. 7). Clypeus weakly domed, more-or-less flattened medially, densely punctate with exception of broad impunctate longitudinal midline medially, punctures separated by 0.5-1 puncture diameters; surface polished and shining. Anterior margin of clypeus narrowly yellow-marked (Fig. 8). Process of labrum small, as wide as long, surface shining. Malar space linear. Gena exceeding width of compound eye; ocelloccipital distance 1.5 times diameter of lateral ocellus. Head covered with long whitish hairs, none equalling length of scape, with some black hairs intermixed on vertex and gena. Antennae basally dark, A4-13 ventrally lightened by presence of brownish scales; A3 slightly exceeds A4+5, shorter than A4+5+6.



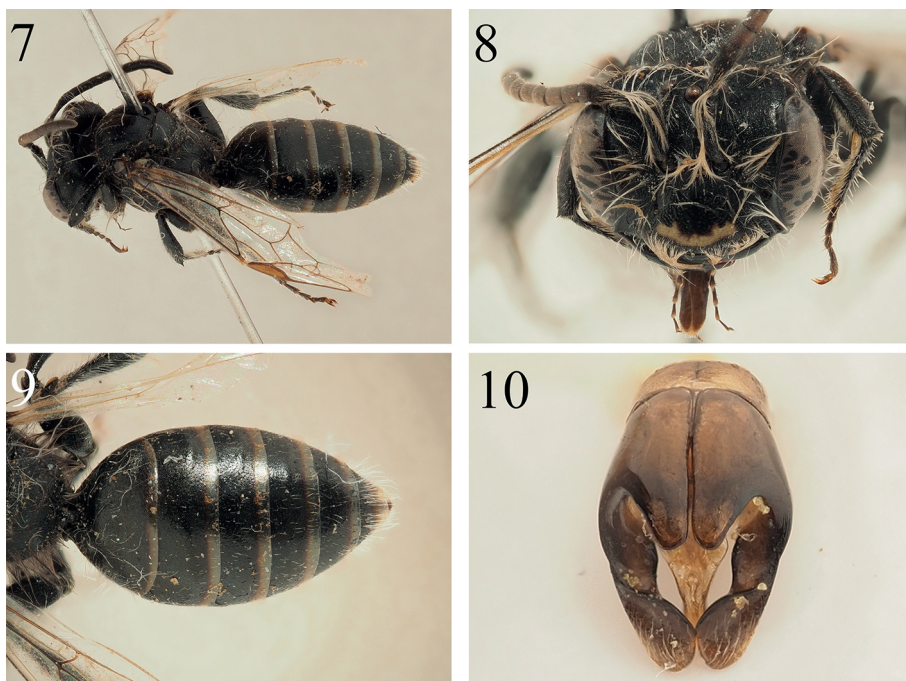


**Figs 3-6:** *Andrena (Planiandrena) aequinoctialis* nov.sp. female: (3) habitus, profile view; (4) face, frontal view; (5) scutum, scutellum, and propodeum, dorsal view; (6) metasoma, dorsal view.

**Mesosoma:** Mesosoma structurally as in female. Mesepisternum, scutum, and scutellum with pale hairs, becoming black on propodeum. Legs dark, pubescence white. Hind tarsal claws with inner tooth. Wings hyaline, stigma and venation orange, nervulus slightly antefurcal.

**Metasoma:** Metasoma structurally as in female (Fig. 9). S8 narrow, sides slightly converging apically, apex slightly broadened and weakly emarginate; ventral surface covered with laterally spreading fringe of brownish hairs. Genital capsule with gonocoxae strongly produced into long rounded teeth, gonostyli robust, inner margin conspicuously broadened basally (Fig. 10). Gonostyli apically flattened and broadened, inner margin strongly raised, surface concave. Penis valves basally broadened, occupying  $\frac{1}{2}$  space between gonostyli, narrowing apically.

**Remarks:** *Andrena aequinoctialis* was collected from *Gagea bulbifera*, an early flowering bulbous plant. The holotype female has the scopa full of pollen from this plant. Several Central Asian members of the subgenus *Planiandrena* have also been collected from bulbous plants, including *A. tobiassi*. Whilst Iranian and Levantine specimens of *Andrena (Planiandrena)* are more associated with flowering trees such as *Acer monspessulanum* (Sapindaceae) (PISANTY et al. 2022, WOOD & MONFARED 2022), the association between Central Asian *Andrena (Planiandrena)* and bulbous plants deserves further investigation.



**Figs 7-10:** *Andrena (Planiandrena) aequinoctialis* nov.sp. male: (7) habitus, profile view; (8) face, frontal view; (9) metasoma, dorsal view; (10) genital capsule, dorsal view.

**Distribution:** South-eastern Kazakhstan.

**Derivatio nominis:** Named for the Spring Equinox, as the specimens were collected on the 21<sup>st</sup> March, which is a significant date in the country of discovery, Kazakhstan, as it marks the beginning of the Nauryz celebrations, a traditional New Year festival that coincides with the spring equinox. It is an adjective in the singular nominative feminine form, i.e. something pertaining to the equinox.

***Andrena (Planiandrena) arenata* OSYTSHNJUK, 1983 (Figs 11-14)**

**Material examined:** Paratype: KAZAKHSTAN: р. Или, 50 км ниже Баканаса [Ili river, 50 km below Bakanas], 14.v.1953, leg. Г. Виктор (G. Viktorov), det. A.Z. Osytsnjuk, 1♀, coll. Zoologische Staatssammlung München.

**Remarks:** *Andrena arenata* is known only from the type series composed of seven females which is housed in the Zoological Museum of Moscow University and the Institute of Zoology in the Ukrainian Academy of Sciences (Kyiv). However, one paratype was found in the Munich collection, along with many other paratype specimens brought to that institute by Osytsnjuk in the 1990s (see also WOOD 2025).

**Distribution:** South-eastern Kazakhstan (OSYTSHNJUK 1983).



**Figs 11-14:** *Andrena (Planiandrena) arenata* OSYTSHNJUK, 1983 female paratype: (11) label details; (12) habitus, profile view; (13) face, frontal view; (14) metasoma, dorsal view.

### *Andrena (Planiandrena) laevis* OSYTSHNJUK, 1983

**Material examined:** Paratypes: TURKMENISTAN: Бадхызск зап. [Badkhyz reserve], корд. Акар-чешме [Akar-Chisme cordon], 5.iv.1977, leg. В. Односум [V. Odnosum], det. A.Z. Osytsnjuk, 1♀, coll. Zoologische Staatssammlung München. Non-types: IRAN: North Khorasan, Ashkhane [Ashkhaneh], 31.v.2022, leg. M. Allahverdi, det. T.J. Wood, 1♀, coll. M. Allahverdi; Razavi Khorasan, 35 k to Soltan Abad, 15.iv.2017, leg. M. Allahverdi, det. T.J. Wood, 2♀♀, coll. M. Allahverdi/coll. T.J. Wood; Razavi Khorasan, Kang-Mashhad, 8.v.2017, leg. M. Allahverdi, det. T.J. Wood, 1♀, coll. M. Allahverdi.

**Remarks:** The holotype was illustrated by ASTAFUROVA et al. (2024: 422). The species was described from western Turkmenistan around the Kopet Dag mountains. It is therefore not surprising that the species is present also in north-eastern Iran based on newly-examined specimens. It has been collected from *Strigosella grandiflora* (Brassicaceae) (OSYTSHNJUK 1983). One paratype was found in the Munich collection.

**Distribution:** Turkmenistan and Iran\* (North Khorasan, Razavi Khorasan) (OSYTSHNJUK 1983, ASTAFUROVA et al. 2024).

### *Andrena (Planiandrena) planirostris* MORAWITZ, 1876

**Material examined:** Non-type: TAJIKISTAN: Darvaz, 10 km W Taval-Dara [Tavildara], 9.v.1991, leg. J. Halada, det. T.J. Wood, 1♀, coll. Biodiversitätszentrum Linz (Oberösterreichisches Landesmuseum Linz, OLML).



**Remarks:** The lectotype was designated and illustrated by ASTAFUROVA et al. (2022: 150).

**Distribution:** Kazakhstan, Uzbekistan, and Tajikistan\* (OSYTSHNJUK 1983, ASTAFUROVA et al. 2022).

***Andrena (Planiandrena) tobiasi* OSYTSHNJUK, 1983 (Figs 15-18)**

**Material examined:** Paratypes: KAZAKHSTAN: Коксенгир, S. Жана-Арка, Караг. [Koksengir, south Zhana-Arka = Atasu, now Zhanaarka, Karaganda], 4.v.1959, leg. Пономарева [A. Ponomareva], det. A.Z. Osyshnjuk, 2♀♀, coll. Zoologische Staatssammlung München.

**Remarks:** ASTAFUROVA et al. (2024: 444) commented that the holotype could not be found in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, the stated depository. Additional paratypes were indicated to be present in the Institute of Zoology in the Ukrainian Academy of Sciences (Kyiv). Two paratypes were found in the Munich collection. OSYTSHNJUK (1983) stated that the holotype was collected on *Gagea bulbifera*, with additional specimens caught on *Tulipa patens* (= *Tulipa sylvestris*, Liliaceae) and *Taraxacum* (Asteraceae). The face of the Munich paratype is covered with large, yellow, spherical pollen grains; these are likely to be grains of Liliaceae, and combined with the floral records, suggest a close relationship with this botanical family.

**Distribution:** Central and western Kazakhstan (OSYTSHNJUK 1983, ASTAFUROVA et al. 2024).



**Figs 15-18:** *Andrena (Planiandrena) tobiasi* OSYTSHNJUK, 1983 female paratype: (15) label details; (16) habitus, profile view; (17) face, frontal view; (18) metasoma, dorsal view.



### Identification key for *Andrena (Planiandrena)* species

The key of OSYTSHNJUK (1983) covers only four of the now nine known species, and must therefore be updated. All nine species are known in the female sex, but only five species are known in the male sex, with the males of *A. arenata*, *A. flagrans*, *A. laevis*, and *A. sella* unknown. Consequently, the male key should be treated with caution, and association with concurrently active females made, as well as taking into account geographic distribution. The illustrations of OSYTSHNJUK (1983), PISANTY et al. (2022), and WOOD & MONFARED (2022) should also be consulted.

1. Six metasomal segments visible, 12 antennal segments; females.....2
  - Seven metasomal segments visible, 13 antennal segments; males .....10
2. Clypeus strongly flattened across its entire surface, flat to with additional longitudinal impressions. Found only in Central Asia.....3
  - Clypeus domed to weakly domed, often partially flattened medially but never across the whole surface of the disc. Found from the Middle East to Central Asia.....4
3. Clypeus almost completely flat, strongly polished and shining (Fig. 17). Clypeus with sparse and widely separated punctures, punctures separated by 2-5 puncture diameters. Central and western Kazakhstan .....*A. tobiasi* OSYTSHNJUK
  - Clypeus flattened with two slight but distinct longitudinal impressions running either side of the longitudinal impunctate midline. Surface of clypeus with exception of longitudinal impunctate midline with dense punctation, punctures separated by <0.5-1 puncture diameters. More widespread; Kazakhstan, Uzbekistan, and Tajikistan .....*A. planirostris* MORAWITZ
4. Terga with apical margins of T2-4 covered with thick and complete hairbands that obscure the underlying surface, extending onto the base of the following tergum (Fig. 14). Tergal hairbands exceeding the length of the marginal areas themselves. Clypeus finely shagreened over majority of surface, becoming polished and shining along apical margin. South-eastern Kazakhstan .....*A. arenata* OSYTSHNJUK
  - Without this combination of characters. Terga with pubescence variable, either without complete hairbands or with hairbands narrow, not exceeding length of marginal areas. Clypeal sculpture variable. Distribution variable .....5
5. Scutellum polished and shining over the majority of its area. Scutum relatively weakly sculptured, usually with a broad area medially with weaker sculpture, weakly to strongly shining.....6
  - Scutellum with granular shagreen or microreticulation, dull. Scutum at most with a small shining area medially, predominantly dull.....9
6. Marginal area and entire disc of T2 red-marked. Clypeus strongly domed, strongly polished over the majority of its area. Propodeal triangle slightly depressed, medially narrowed, internal surface with weakly shining granular microreticulation. Southern Iran (Kohgiluyeh and Boyer-Ahmad).....*A. sella* WOOD
  - Terga uniformly dark. Clypeus weakly domed, sculpture variable from dull, weakly and uniformly shagreened, and medially polished, but never almost entirely polished. Propodeal triangle not depressed, broad and not medially narrowed. Distribution variable.....7
7. Disc of T2-3 basally shagreened, marginal areas very weakly shagreened, almost smooth. Surface of T2-4 with large, shallow, and irregular punctures, punctures separated by 1-3 puncture diameters. T2-4 with narrow apical complete hairbands. Northern Israel and Lebanon (Mount Hermon), northern Iraq .....*A. veterana* PISANTY
  - All tergal discs uniformly polished and shining, almost without sculpture. Terga almost impunctate, with only fine and scattered occasional punctures. Terga without complete apical hairbands, at most with broadly interrupted hairbands. Iran and Turkmenistan.....8
8. Clypeus entirely covered with granular microreticulation, surface dull. Northern Iran (North Khorasan, Razavi Khorasan) and Turkmenistan .....*A. laevis* OSYTSHNJUK

- Clypeus laterally and basally shagreened, medially and apically polished and shining. Southern Iran (Fars) ..... ***A. flagrans* WOOD**
- 9. Clypeus with fine microsculpture in basal half, becoming weakly shagreened and shining in apical half. Tergal margins with apical rim narrowly lightened hyaline-brown, equalling diameter of a lateral ocellus. Northern Israel and Syria (Mount Hermon), Iran (Yazd) ..... ***A. huma* WOOD & MONFARED**
- Clypeus densely punctate over almost entire surface, punctures separated by <0.5–0.5 puncture diameters with exception of broad longitudinal impunctate midline; puncture interspaces weakly shining. Tergal margins with apical rims broadly lightened hyaline-brown, equalling 2 times the diameter of a lateral ocellus (Fig. 6). South-eastern Kazakhstan ..... ***A. aequinoctialis* nov.sp.**
- 10. Genital capsule with the internal margin of the gonostyli conspicuously broadened, inner and outer margins therefore not parallel (Fig. 10). Penis valves broadened basally at point of contact with gonocoxal teeth ..... 11
- Genital capsule with the inner margin of the gonostyli straight or almost straight, more or less parallel with the outer margin, not with a conspicuous internal bulge. Penis valves not noticeably broadened ..... 13
- 11. Clypeus entirely dark. Genital capsule with the gonocoxal teeth strongly produced into acute points. Central and western Kazakhstan ..... ***A. tobiasi* OSYTSJNJK**
- Clypeus partially or predominantly yellow-marked. Genital capsule with the gonocoxal teeth produced into rounded or strongly truncate teeth. Distribution variable ..... 12
- 12. Clypeus with yellow colouration restricted to a narrow long along the apical margin (Fig. 8). Gonocoxae with apical teeth rounded (Fig. 10). Gonostyli with the apical flattened parts broadened, not-parallel-sided, surface concave. South-eastern Kazakhstan ..... ***A. aequinoctialis* nov.sp.**
- Clypeus predominantly yellow-marked, covering at the majority of the visible surface. Gonocoxae with apical teeth strongly truncate and blunt. Gonostyli with apical flattened parts spatulate and parallel-sided. Northern Israel and Lebanon (Mount Hermon), northern Iraq ..... ***A. veterana* PISANTY**
- 13. Genital capsule with the outer margin of the gonostyli showing a slight impression medially. Penis valves broadest submedially before gently narrowing apically. Gonocoxae with teeth long and apically rounded. Northern Israel and Syria (Mount Hermon), Iran (Yazd) ..... ***A. huma* WOOD & MONFARED**
- Genital capsule with the outer margin of the gonostyli straight, without a slight impression. Penis valves broadest basally before gently narrowing apically. Gonocoxal teeth weakly produced, almost truncate. Kazakhstan, Uzbekistan, and Tajikistan ..... ***A. planirostris* MORAWITZ**

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### Zusammenfassung

*Andrena* ist die zweitgrößte Gattung der Bienen und ist in mediterranen, temperaten und trockenen Klimazonen, einschließlich großer Teile Zentralasiens, artenreich. Die *Andrena*-Fauna Zentralasiens ist aufgrund ihrer immensen Größe nur unvollständig bekannt, und bei kürzlichen Untersuchungen wurde eine neue Art von *Andrena* (*Planiandrena*) entdeckt, eine artenarme Untergattung, die vom Nahen Osten bis Zentralasien aufgefunden werden kann. *Andrena*

(*Planiandrena*) *aequinoctialis* nov.sp. aus dem Südosten Kasachstans wird beschrieben, wo sie mit der früh blühenden *Gagea bulbifera* (Liliaceae) assoziiert ist. Zudem wird ein neuer Bestimmungsschlüssel für die Mitglieder der Untergattung vorgestellt, da sie sich nun von ursprünglich vier auf neun Arten vergrößert hat. Die Ergebnisse verdeutlichen die Notwendigkeit von Erhebungen während des Frühjahrs in Zentralasien, um die *Andrena*-Fauna dieser Region besser zu charakterisieren.

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