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World species of *Arthrolytus* (Hymenoptera: Pteromalidae, Pteromalinae), with description of new species

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Abstract: World species of *Arthrolytus* THOMSON, 1878 were studied. Twentyone species of *Arthrolytus*, 9 of them as new species, were found from several regions of the world. They were placed in the subgenera as follows: *A. oezbeki* DOĞANLAR, 1978, *A. oswaldpecki* nov.sp. in *Anadolytus* DOĞANLAR, 1978; *A. ocellus* (WALKER, 1834), *A. glandium* BOUCEK, 1967, *A. nanus* ASKEW & NIEVES ALDREY, 1982, *A. magarsosensis* nov.sp. in *Anarthrolytus* GRAHAM, 1969; and *A. muesebecki* BURKS, 1969, *A. megaspilus* (WALKER, 1874), *A. discoideus* (NEES, 1834), *A. fasciatus* (PROVANCHER, 1881), *A. usubai* KAMIJO, 1981, *A. yazicioglui* nov.sp., *A. gurderei* nov.sp., *A. slovacus* GRAHAM, 1969, *A. kahvecii* nov.sp., *A. maculipennis* (WALKER, 1835), *A. keltoni* nov.sp., *A. geyrazensis* nov.sp., *A. incisus* ASKEW & NIEVES ALDREY, 1982, *A. nenehatunae* nov.sp., *A. nuridemiragi* nov.sp. in *Arthrolytus* s.str. The new species were described. An identification key was provided for the species of the world.

Key Words: *Arthrolytus* spp., Hymenoptera, Pteromalidae, world.

Introduction

The genus *Arthrolytus* was established in the Pteromalidae, as subgenus of *Pteromalus* for its type species *Pteromalus punctatus* was described as by THOMSON (1878). ASHMEAD (1904) and SCHMIEDEKNECHT (1909) designated *Arthrolytus* as valid genus. GRAHAM (1969) discussed the known species of *Arthrolytus*, and gave the diagnostic characters of the genus and provided a new subgenus, *Anarthrolytus* GRAHAM, an identification key for the European species. DOĞANLAR (1978) described another subgenus, *Anadolytus* DOĞANLAR, 1978 and its type species, *Arthrolytus oezbecki* DOĞANLAR, 1978 as original designation and monotypy. Up to date, 13 valid species have been described in the genus *Arthrolytus* (NOYES, 2017). They are widely distributed in the world, except Australia and Africa (NOYES 2017). Until now, 3 species have been described from the Nearctic region, and 10 species from the Euroasian region. From Turkey one species, *A. discoideus* (NEES, 1834), was recorded (DOĞANLAR 1985; ÖNCÜER 1991).

The species of *Arthrolytus* were reported as parasitoids of two American species, *A. muesebecki* BURKS, 1969 ex. *Andricus brunneus* FULLAWAY on *Quercus douglasii* HOOK. & ARN. and *Callirhytis quercusagrifoliae* (p) on *Quercus* (BURKS, 1969) and *A. oezbeki*, as a hyperparasite on *Orthopelma californicum* ASHMEAD (Hym. Ichneumonidae) and *Eurytoma* sp. nr. *acuta* BUGBEE (Hym. Eurytomidae) in the galls of *Diastrophus kincaidii* GILLETTE on *Rubus parviflorus* NUTT. (DOĞANLAR 1978); *A. glandium* is known to attack larvae of *Curculio* sp. (Col. Curculionidae) living in acorns (BOUCEK,

1967). *Arthrolytus ocellus* (WALKER, 1834) was reared from acorn of *Quercus suber* L. containing galls of *Callirhytis glandium* (GIRAUD) (Hym. Cynipidae); *A. nanus* ex gall of *Andricus quercusradicis* (FABRICIUS) (Hym. Cynipidae) on *Quercus pyrenaica* WILLD, and also reared from gall of *Neuroterus albipes* (SCHENCK.) (Hym. Cynipidae); *A. incisus* ex gall of *Andricus quercusradicis* (FABRICIUS) on *Quercus pyrenaica* (ASKEW & NIEVES ALDREY, 1982).

In this work morphological characters of the *Arthrolytus* species from the world fauna were studied and the new species was described and compared with the similar species and an identification key was provided for the World species.

Material and Methods

This study is based upon examination and identification of the specimens collected from several parts of the world. The examined specimens and types of the new species were deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC). Specimens were collected by sweeping net and putting the whole contents of the swept materials directly in 96 % ethanol. After sorting the material, individuals were mounted on cards, and, whole body or antenna and/or forewings of some species were slide mounted in Canada balsam for further morphological studies.

The species were identified by following the key of GRAHAM (1969). Some of the figures, stated in the text, were reproduced from Fig. 17 of GAHAN 1933, Figs 4, 6 of BOUCEK 1967, Fig. 652 of GRAHAM 1969, Figs 10-12 of DOĞANLAR 1978, Figs 8, 10, 11 of KAMIJO 1981, Figs 4-7 and 12, 13 of ASKEW & NIEVES ALDREY 1981, Figs 289-293 of BOUCEK & RASPLUS 1991, Fig. 331 of BOUCEK & HEYDON 1997.

Photographs of diagnostic characters of the genera were taken by using of Leica DM 500 microscopes with a digital Leica ICC 50 camera attached to it.

Terminology and abbreviations:

Morphological terminology follows that of GIBSON et al. (1997) and GRAHAM (1969). Abbreviations used in the key and descriptions are: F1-7 = funicular segments; C1-C3= Club segments.

Results and Discussion

Arthrolytus THOMSON, 1878

Pteromalus (*Arthrolytus*) THOMSON, 1878: 158. Type-species: *Pteromalus* (subgenus *Arthrolytus*) *punctatus* THOMSON by monotypy; ASHMEAD 1904: 225; SCHMIEDEKNECHT 1909: 155.

Arthrolytus (*Anadolytus* DOĞANLAR), 1978: 1111. Subgenus, Type species: *Arthrolytus oezbeki* DOĞANLAR, original designation and monotypy.

Arthrolytus (*Anarthrolytus* GRAHAM), 1969: 792. Subgenus, Type species: *Eutelus ocellus* WALKER, 1834 original designation and monotypy.

D i a g n o s i s : ♀: Head and mesosoma dull, sculptured, Metasoma smooth and shining; head with clypeal margin truncate or with 2 very obscure teeth; right mandible with 4 teeth, left mandible with 3, or both mandible with 3 teeth, dorsal tooth of each mandi-

ble truncate, ventral teeth acute; maxillary palp with 4 segments, apical one long, labial palp with 3 segments, second segment short. Eyes bare or with relatively short inconspicuous pubescence. Occiput not carinate, vertex not broad; head transverse in dorsal aspect, or the head is strongly protuberant at the level of the antennal toruli. Anterior margin of clypeus not deeply incised, at most moderately emarginate. Antennae inserted at or even slightly below level of ventral edge of eyes, antennal formula in ♀ 1 1 2 6 3. Antennal clava with at most a small area of micropilosity on its apical segment only. Antenna with scape almost as long as an eye; first funicular segment elongate, at least slightly constricted in its proximal half, longer than the pedicellus and much longer than any of the other funicular segments, club very short, at most about 1.5 times as long as broad, asymmetrical; or first funicular segment of antenna not constricted proximally, often relatively short; club often relatively longer, then the first funicular segment of the antenna is nearly always shorter than the pedicellus, or first funicular segment of antennae as long as or slightly longer than the pedicellus, flagellum stout and cylindrical, club very short, only about 1.5 times as long as broad.

Pronotum with collar rounded off in front; dorsum of mesosoma not flattened; notauli incomplete, scutellum without frenal groove. Fore wing with apical margin nearly always bare at least between the end of the postmarginal vein and tip of the wing; upper surface, beyond the middle, with ordinary, moderately dense or with only moderately dense pilosity below the marginal vein; usually immaculate, or with a fuscous cloud below the marginal vein or occasionally with infumate cloud. When forewing is maculate, then the marking usually consists of a cloud around or below the stigmal vein; but if there is a single cloud below the marginal vein, immediately beyond the speculum, this cloud usually extending to the marginal and stigmal veins and often forming a transverse band; stigmal vein forming an acute angle or less acute with the postmarginal vein.



Fig. 1: *Arthrolytus* spp. ♀♀ antennae: (a) *A. oezbecki* DOĞANLAR, 1978); (b) *A. ocellus* (WALKER, 1834) (GRAHAM, 1969); (c) *A. nanus* ASKEW & NIEVES ALDREY, 1982; (d) *A. glandium* BOUCEK, 1967 (BOUCEK & RASPLUS, 1991); (e) *A. magarsosensis* nov.sp.; (f) *A. discoideus* (NEES, 1834); (g) *A. usubai* KAMIJO, 1981; (h) *A. yazicioglu* nov.sp., (i) *A. gurderei* nov.sp., (j) *A. slovacus* GRAHAM, 1969; (k) *A. kahvecii* nov.sp., l-n. *A. maculipennis* (WALKER, 1835), (l) (BOUCEK & RASPLUS 1991), (m) (GAHAN 1933), (n) (GRAHAM 1969), (o) *A. keltoni* nov.sp.

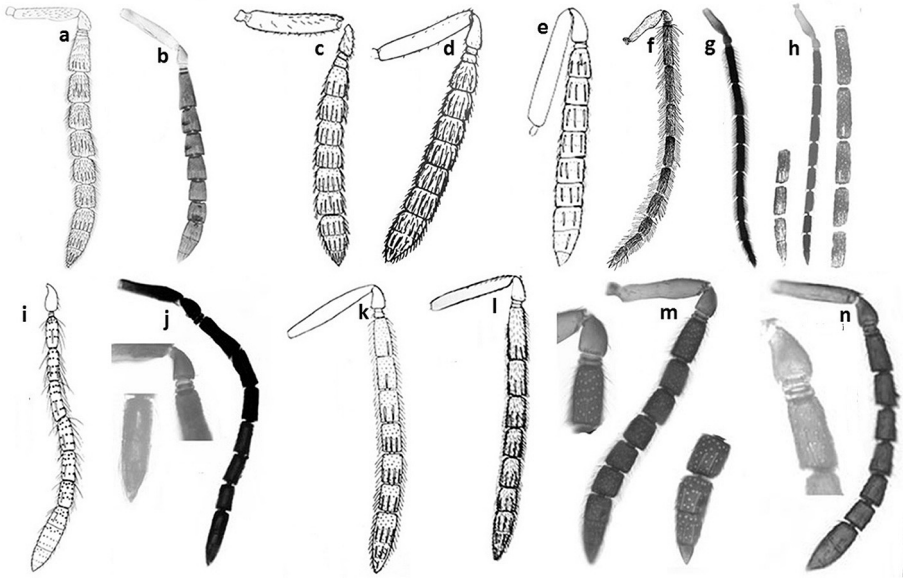


Fig. 2. *Arthrolytus* spp., ♂♂ antennae, (a) *A. oezbeki* DOĞANLAR, 1978; (b) *A. oswaldpecki* nov.sp.; (c) *A. ocellus* (WALKER, 1834) (GRAHAM, 1969); (d) *A. glandium* BOUCEK, 1967 (BOUCEK & RASPLUS 1991); (e) *A. nanus* ASKEW & NIEVES ALDREY, 1982; (f) *A. maculipennis* (WALKER, 1835) (BOUCEK & RASPLUS 1991); (g) *A. discoideus* (NEES, 1834); (h) *A. geyrazensis* nov.sp.; (i) *A. incisus* ASKEW & NIEVES ALDREY, 1982; (j) *A. nenehatunae* nov.sp.; (k) *A. usubai* KAMIJO, 1981; (l) *A. fasciatus* (PROVENCER, 1881) (BOUCEK & HEYDON 1997); (m) *A. nuridemiragi* nov.sp.; (n) *A. yazicioglui* nov.sp.

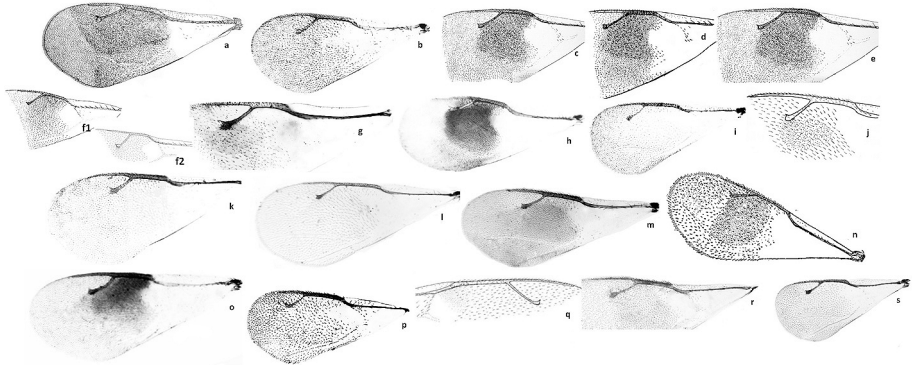


Fig. 3. *Arthrolytus* spp. Forewings: (a) *A. oezbeki* DOĞANLAR, 1978; (b) *A. oswaldpecki* nov.sp.; (c, d) *A. ocellus* (WALKER, 1834) (c) from BOUCEK (1967); (d) from BOUCEK & RASPLUS (1991); (e) *A. glandium* BOUCEK (BOUCEK 1967); (f1) ♀ of *A. nanus* ASKEW & NIEVES ALDREY, 1982; (f2) ♂ of *A. nanus*; (g) *A. magarsosensis* nov.sp.; (h) ♀ of *A. discoideus* (NEES, 1834), (i) ♂ of *A. discoideus*; (j) *A. usubai* KAMIJO, 1981; (k) *A. yazicioglui* nov.sp., (l) *A. gurderei* nov.sp.; (m) *A. kahvecii* nov.sp.; (n) *A. maculipennis* (WALKER, 1835) (GAHAN, 1933); (o) *A. keltoni* nov.sp.; (p) *A. geyrazensis* nov.sp.; (q) *A. incisus* ASKEW & NIEVES ALDREY, 1982; (r) *A. nenehatunae* nov.sp.; (s) *A. nuridemiragi* nov.sp.

Propodeum median carina present, with plicae complete or nearly so, or absent: costula sometimes indicated or propodeum often with some indication of a costula. Propodeal nucha represented merely by a lunate strip which is weakly sculptured or smooth. legs stout, especially femora.

Metasoma ovate, pointed apically in ♀, subflattened dorsally, usually lighter in color at base.

♂: Fore wing with fuscous markings, at least a dark cloud below the stigmal, or hyaline; occiput not margined; Antennae with funicular segments more compacted, separated by inconspicuous peduncles. Antennal formula 11263 or 11272 and 11281; funicular segments mostly elongate, the first segment 3.5 to 5 times, or as long as pedicel; the last segment 1.7 to 2.5 times, as long as broad; Propodeum with plicae indicated in at least the basal half; postspiracular sclerite moderate-sized; head, and mesosoma excluding propodeum, with very inconspicuous hairs which are not whitish. Genae rarely produced ventrad of the clypeal margin; if so, then not forming convex protuberances, and the eyes with short inconspicuous hairs, the antennae sometimes extensively darkened.

D i s t r i b u t i o n : Nearctic, Euroasian regions.

Key to World species of *Arthrolytus*

Females

- 1 Each mandible with 3 teeth; malar space more than half length of an eye; Flagellum distinctly clavate; anelli almost equal in length; the head hardly protuberant at the level of the toruli; Antenna (Fig. 1a) with first funicular segment not constricted basally, almost as long as pedicel; inserted low on head, much nearer to the anterior margin of the clypeus than to the median ocellus, the lower edge of the toruli hardly above the level of the ventral edge of the eyes; combined length of pedicel plus flagellum subequal to breadth of head; antenna with scape: 42; pedicel:12; anelli 1.5, 2.0; F1 14; F2 11; F3 9; F4-F6 8; C1 12; C2 10; C3 8; flagellum 91.5, 2.18x length of scape, Forewing (Fig. 3a) with submarginal vein 1.9-2.04x as long as stigmal vein; post marginal and marginal veins subequal in length, angle between stigmal and post marginal veins 32°; metasoma 1.52-1.65x as long as mesosoma, its maximum breadth 1.25x that of mesonotum *A. (Anadolytus) oezbeki* DOĞANLAR
- Right mandible with 4 teeth, left mandible with 3 teeth; malar space at most 0.48x length of an eye; other characters variable2
- 2 Pedicel almost as long as first funicle or slightly longer *A. (Anarthrolytus)*3
- Pedicel distinctly shorter than F1 *A. (Arthrolytus)*6
- 3 Forewing (Fig. 3c,d) with stigmal vein forming an acute angle (25°) with the postmarginal vein Antenna (Fig. 1b) with flagellum 1.76x length of scape; pedicel almost as long as F1; F6 slightly transverse; club 1.23x as long as F1. Metasoma with a pale spot or transverse band on the basal tergite. Femora usually entirely pale, sometimes with a dark stripe beneath. Fore wing with a broad and very intense fuscous cloud which is usually extended to the hind margin of the wing. Head in dorsal view thicker antero-posteriorly, twice as broad as long or hardly more *A. ocellus* (WALKER, 1834)
- Forewing with stigmal vein forming an acute angle (35°-40°) with the postmarginal vein4
- 4 Forewing (Fig. 3f1) with stigmal vein forming 40° angle to the postmarginal vein; Malar space about 0.33x eye length; metallic colouration on legs absent, except on hind coxae on their outer aspects basally metallic; postmarginal vein 0.7x as long as marginal vein. Head in anterior view 1.29x as broad as high; POL 1.6 OOL; Antenna (Fig. 1c) with flagellum 1.63x length of scape; pedicel almost as long as the anelli plus first funicle; almost twice as long as wide and 1.5x as long as F1; F6 slightly

- transverse; club 2.5x as long as F1; Propodeum medially not quite 0.5 x as long as scutellum, median carina and lateral plicae indicated only anteriorly; median area about 2x as broad as long, reticulate; Legs stramineous to whitish, forewing with a broad, arcuate, light brown band from marginal and stigmal veins almost reaching posterior margin of wing *A. nanus* ASKEW & NIEVES ALDREY, 1982
- Forewing with stigmal vein forming about 35° angle to the postmarginal vein; Malar space at least 0.37x eye length; legs with coxae and femora dark bluish-green 5
- 5 Malar space 0.44x eye length; forewing (Fig. 3e) with post marginal vein at least as long as marginal vein. Head in anterior view 1.27x as wide as long; POL 1.7 OOL; Antenna (Fig. 1d) with flagellum 1.65x length of scape; F6 0.8x as long as wide; club hardly longer than F1; Scutellum transverse, (with axillulae) 1.3x as wide as long; propodeum punctured-reticulate, rather dull, only short, elevated and through a transversally rugose sculpture, differentiated nuchal part more shiny; length of propodeum medially half-length of scutellum; median carina not conspicuous *A. glandium* BOUCEK, 1967
- Malar space 0.37x eye length; forewing (Fig. 3g) with post marginal vein about 1.5x as long as the marginal vein. Head in anterior view 1.4x as wide as long; POL 1.33 OOL; malar space 0.37x length of eye. Antenna (Fig. 1e) with flagellum 2.28x length of scape; F6 almost transverse; club 1.5x as long as F1; Scutellum slightly transverse (with axillulae) 1.16x as wide as long; propodeum finely reticulate, with some fovea basally; length of propodeum medially 1/3 length of scutellum; median carina slightly developed, plicae absent *A. magarsosensis* nov.sp.
- 6 Fore wing without marginal ciliae; mesosoma black, Metasoma light coloured at base, antennal scape pale, flagellum dark; propodeum without transverse costula; fore wing hyaline; pedicel and legs beyond coxae tan; POL 1.5x OOL; Antenna with flagellum 1.72x length of scape; F6 almost transverse; club almost as long as F1; Forewing with submarginal vein 2.6x as long as marginal vein; stigmal and marginal vein equal; post marginal vein slightly longer than marginal vein; Metasoma 1.66x as long as mesosoma, as wide as mesosoma *A. muesebecki* BURKS, 1869
- Fore wing with marginal ciliae 7
- 7 Body with mesosoma black, metasoma purplish cupreous, F1 dark reddish, legs reddish. Head in dorsal view 2.15 times as broad as long. Head and mesosoma very finely punctured, panels of median area of propodeum rather more finely reticulate; antennae black, stout, subclavate, much shorter than mesosoma; Metasoma subsessile, smooth, oval, acute at tip, shorter but hardly narrower than mesosoma, keeled beneath *A. megaspilus* (WALKER, 1874)
- Body with metasoma at most with yellow spot. Other characters variable 8
- 8 Legs with at least femora pale. Other characters variable 9
- Legs with coxae and femora mostly black, concolorous with body, at most tips of femora and tibiae and tarsi pale colorous 11
- 9 Antenna (Fig. 1f) with combined length of pedicel plus flagellum 1.81x as long as scape; Forewing (Fig. 3h) with stigmal vein forming an acute angle (30°) with the postmarginal vein; Head in dorsal view in frontal view 1.33x as broad as long; malar space 0.31x as long as eye height; POL 1.9 OOL; Antenna with flagellum 1.9x length of scape; anelli plus F1 1.55x as long as pedicel; club 1.35x longer than F1 F1 1.83x as long as broad (20:14); F5-F6 distinctly transverse (12:17). Forewing (Fig. 3h) with submarginal vein 1.67x as long as marginal vein; marginal vein 1.3x stigmal vein; post marginal vein 1.43x stigmal vein Antennae with combined length of pedicel and flagellum usually slightly less than the breadth of the head; Propodeum with panels of median area rather more coarsely reticulate, without transverse costula and median carina, lateral carina distinct basally. Body black, legs with coxae concolorous with body, femora, tibiae and tarsi yellow; Metasoma 1.22x as wide as mesosoma *A. discoideus* (NEES, 1834)
- Antenna with combined length of pedicel plus flagellum at least 2.2x as long as scape ... 10

- 10 Antenna with combined length of pedicel plus flagellum 2.2x as long as scape; Fore wing shaded behind marginal vein; all legs beyond coxae yellow. Malar space 0.33x as long as eye height; POL 1.5 OOL; Antenna with anelli plus F1 1.4x as long as pedicel; club slightly shorter than F1 (15:17); flagellum 1.86x length of scape. Forewing with submarginal vein 2.5x as long as marginal vein; stigmal and marginal vein equal; post marginal vein 1.2x as long as marginal vein; propodeum with lateral carina interrupted in the middle, a transverse costula present midway between base and apex of propodeum; surface of propodeum anterior to this costula sculptured, surface posterior to costula smooth and shining; strong median carina present. Metasoma as wide as mesosoma..... *A. fasciatus* (PROVANCHER, 1881)
- Antenna (Fig. 1g) with combined length of pedicel and flagellum equal to breadth of the head; 2.3x as long as scape. Forewing with stigmal vein forming angle 45° with the postmarginal vein. Malar space 0.30x length of an eye. POL 1.8 OOL. Antenna (Fig. 1g) with anelli plus F1 1.44x as long as pedicel; pedicel 0.82x as long as F1; club 1.64x as long as F1. flagellum 2.12x length of scape. Forewing (Fig. 3j) with and marginal vein 1.3-1.5x stigmal vein; post marginal vein 0.9x as long as marginal vein; propodeum medially 0.33x as long as scutellum, median area transversally elevated and finely strigose-reticulate, with apical and basal foveae deep and large; with distinct median carina, plicae sharp posteriorly, indicated anteriorly by basal foveae; nucha occupying 1/4 median length of propodeum, well defined in front, weakly and transversally sculptured. Legs brownish yellow, except coxae concolorous with mesosoma; tarsi darker at apex..... *A. usubai* KAMJO, 1981
- 11 Body black, with metallic reflaction; legs with coxae and femora concolorous with body, mid and hind tibiae fuscous dorsally and yellow ventrally, fore tibiae and tarsi yellow; Forewing (Fig. 3k) with stigmal vein forming an acute angle (30°) with the postmarginal vein; Antenna (Fig. 1h) with combined length of pedicel plus flagellum 2.57x as long as scape; with anelli plus F1 2.25x as long as pedicel; F6 distinctly transverse. club 1.67x as long as F1. flagellum 1.97x length of scape; OOL 0.62 POL; Forewing without black spot, shaded behind marginal vein; with submarginal vein 1.71x as long as marginal vein; marginal vein 1.3x stigmal vein; post marginal vein equal to marginal vein. Propodeum with transverse costula; median and plicae slightly developed. Metasoma 1.95x as long as broad, 1.2x longer than mesosoma, as wide as mesosoma..... *A. yazicioglu* nov.sp.
- Forewing with stigmal vein forming an less acute angle (35°-40°) with the postmarginal vein..... 12
- 12 Antennae inserted well above level of ventral edge of eyes, their toruli about equidistant from the anterior margin of the clypeus and the median ocellus; head hardly protuberant at level of toruli; Head in dorsal strongly transverse, at least 2.25 times as broad as its maximum length, with temples hardly one sixth as long as eyes. The pedicel 0.63-0.75x as long as anelli plus first funicle; Forewing without black spot or at most with a faint infumate discal cloud..... 13
- Antenna inserted low, slightly above level of ventral edge of eyes; forewing with black spot. other characters variable 15
- 13 Head in dorsal about 2.25 times as broad as its maximum length. Metasoma with a yellowish band across the basal tergite; venter extensively pale. Antenna (Fig. 1j) with combined length of pedicel and flagellum 1.3-1.4x as long as the breadth of the head; anelli plus F1 1.53x as long as pedicel; flagellum 2.5x length of scape, club slightly shorter than length of F1. Forewing with marginal vein 1.8x as long as stigmal vein, and slightly longer than post marginal vein; Propodeum (medially) hardly half as long as scutellum; its median area about 1.8 times as broad as long, the panels finely reticulate. (Czechoslovakia) *A. slovacus* GRAHAM, 1969
- Malar space hardly one third length of an eye. Wings slightly yellowish, with a faint infumate discal cloud. Other characters variable 14
- 14 Malar space about 0.39x length of an eye. Head in dorsal view 2.43x as broad as long. Metasoma without pale spot. Forewing without black spot; Antenna (Fig. 1i) with combined length of pedicel and flagellum almost as the breadth of the head; anelli plus F1 1.32x as long as pedicel; flagellum 2.23x length of scape; club 1.6x length of F1; OOL 0.52 POL; Forewing (Fig. 3l) with marginal vein 1.94x stigmal vein; post

- marginal vein 1.35x marginal vein; stigmal vein forming 35° angle to the postmarginal vein; speculum and basal cell open; Propodeum with transverse costula, median and plicae; (medially) 0.73x as long as scutellum; its median area about 1.26 times as broad as long *A. gurderei* nov.sp.
- Head in dorsal about 2.31 times as broad as its maximum length. metasoma testaceous with bluish reflection; Antenna (Fig. 1k) with combined length of pedicel and flagellum almost as long as the breadth of the head; anelli plus F1 1.2x as long as pedicel; flagellum 2.24x length of scape, club 1.36x as long F1, Forewing (Fig. 3m) with angle between stigmal and post marginal veins 40°; submarginal vein 1.63x as long as marginal vein; marginal vein as long as post marginal vein, post marginal vein 1.43x marginal vein Propodeum medially 0.33x as long as scutellum; its median area about 2.5 times as broad as long, the panels distinctly reticulate *A. kahvecii* nov.sp.
- 15 Tip of club acuminate, long. Forewing with costal cell of fore wing 10.5-11 times as long as broad; sometimes relatively longer; Malar space hardly one third length of an eye; Antenna (Fig. 1l-n) with anelli plus F1 2.4x as long as pedicellus; F1 2.21x as long as width; F2 slightly longer than width; F3 quadrate; F4 slightly, F5-F6 distinctly transverse. club 0.88x as long as F1. Forewing (Fig. 3n) submarginal vein 1.32x as long as marginal vein; marginal vein 1.57x stigmal vein; post marginal vein equal to marginal vein. MESOSOMA black, Metasoma light coloured at 5th and 6th segments, antennal scape and pedicel pale, flagellum dark, legs beyond coxae yellow; Forewing with black spot; Propodeum with transverse costula, median and plicae. Metasoma often with a pale transverse band on the basal tergite, sometimes the whole base yellowish Metasoma 1.3x longer than as mesosoma *A. maculipennis* (WALKER, 1835)
- Forewing (Fig. 3o) with costal cell of fore wing 8.4 times as long as broad. Malar space hardly one third length of an eye; Antenna with anelli plus F1 1.63x as long as pedicellus; F1 2.25x as long as width; F2-F4 distinctly longer than width; F5-F6 quadrate, club 1.3x as long as F1. Antenna (Fig. 1o) with combined length of pedicel plus flagellum 1.83x as long as scape; Forewing (Fig. 3o) with submarginal vein 1.32x as long as marginal vein; and marginal vein 1.2x stigmal vein; post marginal vein 1.12x as long as marginal vein. propodeum with lateral carina complete, a transverse costula present midway between base and apex of propodeum; surface of propodeum anterior to this costula sculptured, surface posterior to costula with some carinae; strong median carina present. Body black, Metasoma without black spot; Metasoma 0.33 longer than as mesosoma. *A. keltoni* nov.sp.

Males

- 1 Each mandible with 3 teeth or 2 teeth sharp and one tooth entire; F1 distinctly constricted basally and distinctly wider than pedicel (at least 1.7x) *Arthrolytus* (*Anadolytus*) 2
 - Right mandible with 4 teeth, left mandible with 3 teeth; F1 at most slightly constricted basally; other characters variable 3
- 2 Malar space more than half length of an eye; Antenna (Fig. 2a) with combined length of pedicel plus flagellum 1.4x as long as breadth of head; scape with a projection on upper half ventrally; pedicel about 1.67 times as long as broad and 0.55x as long as F1; flagellum 3.5x length of scape, F1 1.4x; F2 1.29x, F3-F5 1.15x as long as wide, F6 distinctly smaller than preceding segments and 1.3x as long as wide; club 3x as long as width, 1.8x as long as F1; linear sensillae on F1 4; F2 5 in two rows, medially; F3-F4 4-5, in one row medially; F5-F6 5-4 in one row apically; C1-C2 4; C3 2. Forewing with costal cell 9.87 times as long as broad; marginal vein at the average 1.16-1.29x as long as stigmal vein; post marginal and marginal veins subequal in length, angle between stigmal and post marginal veins 32°; speculum open; propodeum about 0.4x length of scutellum, median area punctured-reticulated; costula slightly indicated, plicae distinct posteriorly; median carina complete, broken medially; median area 2.5x as wide as long; body metallic green with golden reflection, femora testaceous; metasoma black *A. oezbeki* DOĞANLAR, 1978

- Malar space 0.19-0.22x eye length; Antenna (Fig. 2b) with combined length of pedicel plus flagellum 1.37x as long as breadth of head; scape basally narrow, slightly expanded medially; pedicel 1.54x as long as wide and 0.5x as long as F1; flagellum 3.14x length of scape; F1 2x; F2-F4 1.3x; F5 1.05; F6 quadrate; club 2.4x as long as broad, as wide as F6, 1.2x as long as F1; linear sensillae on F1 4; F2 6 in two rows; F3-F6 3-4, in one row apically; C1 3; C2 3; C3 2;. Forewing (Fig. 3b) with stigmal vein forming 40° angle to the postmarginal vein; with a faint cloud slightly darker around stigmal vein; costal cell 8.67 times as long as broad; post marginal vein 1.21x marginal vein and 1.7x stigmal vein; marginal vein 1.4x stigmal vein; speculum narrowly open; propodeum about 0.54x length of scutellum, median area finely reticulated; with transverse costula, plicae and median carina; median area 1.37x as wide as long body black with bluish metallic reflection; legs with coxae concolorous with body; femora fuscous, tibiae and tarsi yellow. Propodeum about 0.54x length of scutellum, median area finely reticulated; with transverse costula, plicae and median carina; median area 1.37x as wide as long with broad pale band basally; 0.9x as long as mesonotum *A. oswaldpecki* nov.sp.
- 3 Antenna with pedicel at least slightly longer than F1 (1.1x) and distinctly narrower than F1 (at most 0.67x); Antenna with combined length of pedicel and flagellum equal to breadth of head; fore wing with a fuscous spot *Arthrolytus* (*Anarthrolytus*).....4
- Antenna with pedicel distinctly shorter than F1 (at least 0.83x) and almost as wide as F1; Combined length of pedicel and flagellum at least 1.2 times the breadth of the head, Other characters variable *Arthrolytus* (*Arthrolytus*).....6
- 4 Forewing with stigmal vein forming 30° angle to the postmarginal vein; metasoma without pale spot; malar space about 0.33x eye length. Antenna (Fig. 2c) with pedicel twice as long as wide and 1.1x as long as F1; flagellum 2.25x length of scape, F1 1.4x; F6 0.9x as long as wide; club 20:10, 3 segmented, acuminate, long, 1.82x as long as F1; linear sensillae funicular and club segments with at least 4-5 longitudinal sensillae; Forewing with measurements of m:pm:st as 25: 28: 18; pm about 1.12x as long as the marginal vein, and 1.55x stigmal vein; marginal vein at the average 1.62x (with the minimum encountered 1.49x) as long as stigmal vein; femora metallic..... *A. ocellus* (WALKER, 1834)
- Forewing with stigmal vein at least forming 35° angle to the postmarginal vein.....5
- 5 Forewing with stigmal vein forming 35° angle to the postmarginal vein; Metasoma without pale spot; Malar space 0.44x eye length. Antenna (Fig. 2d) with pedicel hardly 1.25x as long as wide, and 1.12x as long as F1; flagellum 1.9x length of scape, F1 twice; F6 1.2x as long as wide; club about 1.2x as long as F1. Forewing with measurements of m:pm:st as 15: 17: 12; pm about 1.13x as long as marginal vein, and 1.42x stigmal vein; marginal vein 1.25x as long as stigmal vein. Body black, with bluish metallic reflection. Legs with femora mainly infuscate, metallic, except, tibiae and tarsi yellow *A. glandium* BOUCEK, 1967
- Forewing (Fig. 3f2) with the stigmal vein forming 47° angle to the postmarginal vein; metasoma with basal tergite entirely pale testaceous; malar space about 0.33x eye height. Antenna (Fig. 2e) with pedicel twice as long as wide and 1.2x as long as F1; flagellum 1.86x length of scape, F1 1.28x, F6 0.8x as long as wide; club 2.1x as long as F1. Forewing with measurements of m:pm:st as 15: 16: 14; pm 1.07x as long as marginal vein, and 1.14x stigmal vein; marginal vein 1.07x as long as stigmal vein. Legs stramineous to whitish, only hind coxae on their outer aspects basally metallic, pretarsi brown *A. nanus* ASKEW & NIEVES ALDREY, 1982
- 6 Forewing without marginal ciliae; clypeal margin obscurely bi-dentate. OOL 2/3 POL; malar space about 0.33x eye height. Antenna with pedicel 0.45x as long as F1; flagellum 2.43x length of scape, club slightly shorter than F1. Forewing with stigmal and marginal vein equal; post marginal vein slightly longer than marginal vein; Head and mesosoma green, metasoma brown, with yellow cross-band near base, antennal scape yellow, pedicel tan; flagellum dark brown; fore wing hyaline; coxae concolorous with body, legs beyond coxae tan; propodeum without transverse costula; fore wing hyaline; pedicel and legs beyond coxae tan. Metasoma as long as mesosoma..... *A. muesebecki* BURKS, 1969
- Fore wing with marginal ciliae.....7

- 7 Antennae either with 7 funicular segments and a 2-segmented clava; or else with all 9 flagellar segments separated by peduncles; combined length of pedicel and flagellum 2.1-2.75 times the breadth of the head; segments of funicle elongate, the first 3.5-5.5 times, the seventh 1.8-3.0 times as long as broad.....7
- Antennal formula 11263; other characters variable.....9
- 7 Antenna (Fig. 2f) with 9 flagellar segments separated by peduncles, therefore no club is differentiated, Antenna: scape 11, in anterior view its anterior margin distinctly convex, posterior margin almost straight; pedicel 1.5x as long as wide and 0.26x as long as F1; flagellum 70, 6.36x length of scape, filiform; funicular segments gradually decreasing in length, F1 11.5, F2 9; F3 7.5; F4 7; F5 7; F6 6.5; F7 5, 2.5x as long as wide; F8 4.5; F9 6 (=club 1 segmented), acuminate, short, 0.52x as long as F1; linear sensillae on F1 5, in 3 rows; F2-F9 4 in 2 rows, (3 apically, 1 medially); Forewing with costal cell 10-13 times as long as broad; speculum sometimes effaced by scattered hairs; F1 equal length as scape; scape distinctly expanded in its upper half, where there is a distinct shiny boss on its outer aspect. Fore wing with speculum, on lower surface of wing, more or less effaced by scattered hairs; basal cell partly, sometimes entirely, pilose. Larger species, up to 3.1 mm*A. maculipennis* (WALKER, 1835)
- Antennae with 7 funicular segments and a 2-segmented clava, with scape in anterior view its anterior margin slightly convex, posterior margin almost straight, hardly expanded in its upper half, the subapical shiny boss tending to be indistinct.....8
- 8 Antenna (Fig. 2g) with scape 0.9x length as F1; pedicel 0.8x as long as wide and 0.2x as long as F1; flagellum 6.94x length of scape, F7 2.5-2.62x as long as wide; club 0.75x as long as F1; linear sensillae on F1 2; F2 3; F3 3; F4-F7 4, C1 3; C2 1; Head in lateral view 1.8x as long as width; in anterior view 1.28x as wide as high; in dorsal view 2.4x as wide as long, 1.15x wider than mesoscutum; in anterior view wide of frons 2.06x width of eye; lower margin of clypeus entire; POL 2x OOL; eye 1.38x as long as width; malar space 0.36x eye length. Scutellum 1.22x longer than broad; propodeum finely reticulate, without fovea basally; length of propodeum medially 0.35x length of scutellum; median carina, lateral carina and costula developed. Forewing (Fig. 3i) with stigmal vein forming 40° angle to the postmarginal vein; costal cell 9.0-9.5 times as long as broad. without fuscous cloud; speculum bare or nearly so; postmarginal vein about 0.77x as long as the marginal vein, 1.11x as long as stigmal vein; marginal vein 1.44x as long as stigmal vein. Body black with bluish metallic reflection; legs with coxae concolorous with body, fore and mid femora in basal half, hind femora wholly fuscous, tibiae and tarsi yellow, metasoma with a pale band on second tergite.....*A. discoideus* (NEES, 1834)
- Antenna (Fig. 2h) with scape as long as F1; pedicel 1.25x as long as wide and 0.3x as long as F1; flagellum 6.35x length of scape; F7 as long as wide; club 0.88x as long as F1; linear sensillae on F1 absent; F2 1; F3 2; F4-F6 3; F7 2; C1 3; C2 1. Head in lateral view 1.6x as long as width; in anterior view 1.28x as wide as high; in dorsal view 2.4x as wide as long, 1.3x wider than mesoscutum; in anterior view wide of frons 1.87x width of eye; lower margin of clypeus slightly emarginated in the middle; POL 2x OOL; eye 1.33x as long as width; malar space 0.4x eye length. Scutellum slightly transverse 1.11x as wide as long; propodeum finely reticulate medially, 0.4x length of scutellum; median area 1.72x as wide as long, costula distinct, median carina absent, plicae developed. Forewing (Fig. 3p) with stigmal vein forming 50° angle to the postmarginal vein; costal cell 10 times as long as broad; with speculum narrow, narrowly opened; basal vein distinct, with hair line; basal cell with some hairs; postmarginal vein about 0.6x as long as the marginal vein; 1.27x as long as stigmal vein; marginal vein 2.1x as long as stigmal vein. Body black with bluish metallic reflection; legs fuscous with metallic reflexion, except tips of femora, tibiae and tarsi yellow; metasoma basally with pale spot *A. geyrazensis* nov.sp.
- 9 Club at least 3.13 times as long as broad.....10
- Club at most 2.94 times as long as broad14
- 10 Club at least 3.66 times as long as broad; Antenna with combined length of pedicel and flagellum 1.29-1.5x breadth of head.....11
- Club at most 3.16 times as long as broad13

- 11 Anterior margin of clypeus incised. Antenna (Fig. 2i) with club 3.84x as long as broad, very slightly broader than funicle segments. F2 3x as long as width; propodeal plicae absent. Antenna with combined length of pedicel and flagellum 1.29 x breadth of head; scape linear without anterior expansion, extending slightly above vertex; pedicel in profile about 2x as long as broad, 0.83x as long as F1; anelli subequal; flagellum filiform, first funicle segment narrower than pedicel, first three funicle segments all about 3x as long as broad, the sixth about 2x as long as broad. Metasoma with venter and first three tergites yellow; number of linear sensillae on flagellar segment as: F1-F6 and C1 one sensillae, C2-C3 without sensillae. Forewings (Fig. 3q) hyaline, with a weak brown infuscation posterior to parastigma; with costal cell 11x as long as width.....
..... *A. incisus* ASKEW & NIEVES ALDREY, 1982
- Anterior margin of clypeus entire or slightly immargined; Antenna with combined length of pedicel and flagellum at least 1.3x as long as breadth of the head; club at most 3.66x as long as broad.....12
- 12 Antenna (Fig. 2j) with combined length of pedicel and flagellum almost 1.5x as long as breadth of the head; pedicel 1.5x as long as wide and 0.5x as long as F1; flagellum 4.68x length of scape, filiform; funicular segments as wide as pedicel, almost in same width; club 3.66x as long as broad, about as long as 2.0x of the preceding funicular segments; F1 2.6x as long as broad; F2 2.14x as long as width; F6 1.67x as long as wide; Propodeum with median area 1.66x as wide as long, with broad fovea basally; without transverse costula, plicae and median carina; forewing (Fig. 3r) with a cloud, slightly darker below stigmal vein; post marginal vein 1.14x marginal vein and 1.41x stigmal veins; marginal vein 1.23x stigmal vein, 0.88x postmarginal vein. Antenna with pedicel yellow. Metasoma with a yellow band on second and third tergite.....
..... *A. nenehatunae* nov.sp.
- Antenna with combined length of pedicel and flagellum 1.3-1.4 times the breadth of the head; pedicel only about 1.5 times as long as broad, somewhat shorter than the first funicular segment; flagellum distinctly stouter than the pedicel, latter as seen in dorsal view; hairs of flagellum slightly shorter than the breadth of the segments that bear them, standing out at about 45°; segments of funicle short, club about 3.5 times as long as broad, about as long as 2 and half the preceding funicular segments; F1 twice as long as broad, F2 about 1.8x as long as width; F6 slightly longer than broad. Median area of propodeum only about 1.5 times as wide as long, reticulate, with complete plicae; forewing immaculate; marginal vein about 1.8 times as long as the stigmal vein, and slightly longer than postmarginal vein; pedicel brown; all coxae mainly black. Metasoma oval, as long as but narrower than the mesosoma; blackish with a yellowish spot on the basal tergite..... *A. slovacus* GRAHAM, 1969
- 13 Antenna (Fig. 2k) with pedicel 1.7-1.9x as long as broad, 0.6x as long as F1; flagellum 2.68x length of scape; F1 2.28x as long as broad, 1.78x as long as pedicel; 1.23x as long as F2; F6 1.33x as long as broad; club 3.13x as long as broad, 1.56x length of F1. Number of linear sensillae on F1 and F2 1; F3 2; F4 and F6 3-4; C1 and C2 3 sensillae; Propodeum with median carina strong, plicae sharp posteriorly, indicated anteriorly by basal foveae; dorsum of metasoma with a large brown spot basally; forewing with a cloud slightly darker..... *A. usubai* KAMIJO, 1981
- Antenna (Fig. 2l) with scape almost parallel sided, pedicel 1.6x as long as wide and 0.44x as long as F1; flagellum 3.16x length of scape; F1 3.0x as long as broad, 2.2x as long as pedicel; 1.47x as long as F2; F6 1.5x as long as width; club, 3.16x as long as broad as long as F1. Number of linear sensillae on F1-F6 3-4, in one row apically; C1 3; C2 3; C3 2. Propodeum with median carina strong, plicae interrupted medially, costula present. Head and mesosoma black with slight greenish cast, noticeably more hairy than ♂, metasoma dark brown, shining, with yellow spot at base; antennal scape and pedicel yellow, flagellum dark brown; coxae, propodeum, and base of metasoma with iridescent blue or green luster; femora mostly brown, tibiae and tarsi yellow; wings hyaline, veins tan. Metasoma and mesosoma equal in length.....
..... *A. fasciatus* (PROVANCER, 1881)
- 14 Antenna (Fig. 2m) with club about 2.94 times as long as broad; 1.67x as long as F1; combined length of pedicel and flagellum (34), almost as long as breadth of the head; flagellum 3.2x length of scape, the latter basally narrow, expanded in its upper half, the subapical shiny boss tending to be indistinct; pedicel 1.6x as long as wide and 0.73x as

long as F1; the latter only slightly constricted basally, F2 1.37x, F3-F4 1.11x as long as width; Linear sensillae on F1-F2 1; F3 3; F4 2; F5 2; F6 2; C1 3; C2 3; C3 2. Forewing (Fig. 3s) with stigmal vein forming 40° angle to the postmarginal vein; the latter 0.87x marginal vein and 1.33x stigmal veins; marginal vein 1.53x stigmal vein; basal cell bare, basal vein hairy; speculum narrowly open. Propodeum with median area at least 0.47x length of scutellum; costula slightly indicated, median carina absent, lateral carina in basal half distinctly developed. Femora fuscous with metallic reflexion except tips of femora, tibiae and tarsi fuscous. metasoma basally without pale spot; Head in lateral view 1.82x as height as long; Head in dorsal view as wide as mesoscutum, POL 1.9x OOL; Malar space 0.42x eye length; eye long oval 1.5x as long as width

-*A. nuridemiragi* nov.sp.
- Antenna (Fig. 2n) with combined length of pedicellus and flagellum 1.26 times the breadth of the head; femora testaceous, tibiae and tarsi yellow POL 1.43x OOL. Malar space 0.37x eye length; Antenna (Fig. 2n) with club about 2.67 times as long as broad; 1.7x as long as F1; flagellum 4.25x length of scape; the latter almost parallel sided; pedicel 1.4x as long as wide and 0.8x as long as F1; the latter slightly constricted basally, 1.2x as long as pedicel F2 1.63x; F3-F4 1.43x as long as width; F5-F6 1.13x as long as broad. linear sensillae on flagellar segment as: F1 1; F2 3; F3 3; F4 and F6 3-4; C1 and C2 3; Forewing with stigmal vein forming 45° angle to the postmarginal vein; the latter 1.06x marginal vein and 1.25x stigmal veins; marginal vein 1.15x stigmal vein; basal cell with 4-5 hairs distally, basal vein distinctly indicated, speculum open; Propodeum with median area at least 0.8x length of scutellum; with plicae complete, median carina and basal fovea absent. Metasoma black, without pale spot. Head in lateral view 1.6x as height as long; in dorsal view 1.15x width of mesoscutum; eye long oval 1.31x as long as width; metasoma 0.72x as long as mesosoma
-*A. yazicioglu* nov.sp.

Arthrolytus (Anadolytus) DOĞANLAR, 1978

D i a g n o s i s : ♀: Each mandible with 3 teeth; Malar space more than half length of an eye.

♂: Each mandible with 3 teeth or 2 teeth sharp and one tooth entire; F1 distinctly constricted basally and distinctly wider than pedicel (at least 1.7x).

Arthrolytus oezbeki DOĞANLAR, 1978 (Figs 1a, 2a, 3a)

T y p e m a t e r i a l s : Holotype ♀, Burnaby, B.C. 25.01.1978, Leg. M. Doğanlar, CNC. Paratypes: 1♀, Arcata, California, 22.II.1972, Leg. J.K. Wangberg (CNC); 9♀♀, Burnaby, B.C., 01-11. IV. 1977. Leg. M. Doğanlar; 94♀♀, 180♂♂, Burnaby, B.C., 08-22.XII. 1977-23-27. I. 1978. Leg M. Doğanlar. Deposition of types: 5♀♀, 5♂♂ (CNC); 5♀♀, 5♂♂ (USNM); 5♀♀, 5♂♂ in the Museum of Simon Fraser University, Canada; the remainder in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

D i a g n o s i s : ♀: Each mandible with 3 teeth; Forewing (Fig. 3a) with marginal ciliae; malar space more than half length of an eye; the head hardly protuberant at the level of the toruli; Antenna (Fig. 1a) with flagellum distinctly clavate; anelli almost equal in length; first funicular segment not constricted basally, almost as long as pedicel, inserted low on head, much nearer to the anterior margin of the clypeus than to the median ocellus, the lower edge of the toruli hardly above the level of the ventral edge of the eyes; combined length of pedicel plus flagellum subequal to breadth of head; flagellum 2.18x length of scape; pedicel 1.46x as long as the anelli plus first funicle; 1.7x as long as wide and 1.5x as long as F1; F4-F6 distinctly transverse, 1.4x as wide as long; club 2.5x as long as F1. Forewing (Fig. 3a) with costal cell 9.87 times as long as broad; marginal vein at the average 1.16-1.29x as long as stigmal vein; submarginal vein 1.9-2.04x as long as stigmal vein; post marginal and marginal veins subequal in length, angle

between stigmal and post marginal veins 32^0 ; speculum open; Propodeum about 0.4x length of scutellum, median area punctured-reticulated; costula slightly indicated, plicae distinct posteriorly; median carina complete, broken medially; median area 2.5x as wide as long; body metallic green with golden reflection, femora testaceous; metasoma black; metasoma 1.52-1.65x as long as mesosoma, its maximum breadth 1.25x that of mesonotum.

♂♂: Similar to ♀ except as follows: Antenna (Fig. 2a) with F1 distinctly constricted basally and distinctly wider than pedicel (at least 1.7x); combined length of pedicel plus flagellum 1.4x as long as breadth of head; scape with a projection on upper half ventrally; pedicel about 1.67 times as long as broad and 0.55x as long as F1; flagellum 3.5x length of scape, F1 1.4x; F2 1.29x, F3-F5 1.15x as long as wide, F6 distinctly smaller than preceding segments and 1.3x as long as wide; club 3x as long as width, 1.8x as long as F1; linear sensillae on F1 4; F2 5 in two rows, medially; F3-F4 4-5, in one row medially; F5-F6 5-4 in one row apically; C1-C2 4; C3 2.

Description: given by DOĞANLAR (1978).

Host: hyperparasite on *Orthopelma californicum* ASHM. (Hym. Ichneumonidae) and *Eurytoma* sp. nr. *acuta* BUGBEE (Hym. Eurytomidae) in the galls of *Diastraphus kincaidii* GILLETTE on *Rubus parviflorus* NUTT. (DOĞANLAR 1978).

Distribution: Canada: British Columbia, Burnaby; USA: California, Arcata.

***Arthrolytus oswalpecki* nov.sp. (Figs 2b, 3b)**

Type materials: Holotype ♂, Canada: Ontario, Dundas, 28.vi.1955, O. Peck, deposited in the CNC. Paratype: ♂, same data as holotype.

Etymology: The name is derived from the name of Dr. Oswald Peck who collected the types.

Diagnosis: Malar space 0.19-0.22x eye length; combined length of pedicel plus flagellum 1.37x as long as breadth of head; Antenna: scape basally narrow, slightly expanded medially; pedicel 1.54x as long as wide and 0.5x as long as F1; flagellum 3.14x length of scape; F1 2x; F2-F4 1.3x; F5 1.05; F6 quadrate; club 2.4x as long as broad, as wide as F6, 1.2x as long as F1; linear sensillae on F1 4; F2 6 in two rows; F3-F6 3-4, in one row apically; C1 3; C2 3; C3 2; Forewing with stigmal vein forming 40^0 angle to the postmarginal vein; with a faint cloud slightly darker around stigmal vein; costal cell 8.67 times as long as broad; post marginal vein 1.21x marginal vein and 1.7x stigmal vein; marginal vein 1.4x stigmal vein; speculum narrowly open; Propodeum about 0.54x length of scutellum, median area finely reticulated; with transverse costula, plicae and median carina; median area 1.37x as wide as long body black with bluish metallic reflection; legs with coxae concolorous with body; femora fuscous, tibiae and tarsi yellow. Propodeum about 0.54x length of scutellum, median area finely reticulated; with transverse costula, plicae and median carina; median area 1.37x as wide as long with broad metasoma pale band basally; 0.9x as long as mesonotum.

Description: The diagnostic characters of this species are given above and need not be repeated here. Some additional characters are the following:

♂: Body 2.1 mm long. body black with bluish metallic reflection, Metasoma black, basally with yellow band; antenna with scape pale yellow, pedicel and anelli fuscous, funicular segments and club black legs with coxae, concolorous with body; femora testa-

ceous, tibiae and tarsi yellow; forewing with a faint cloud slightly darker around stigmal vein.

Head in lateral view 37:18; in anterior view 47:37, almost as wide as height; in dorsal view 48: 18, 1.37x wider than mesoscutum (35); wide of frons 29; lower margin of clypeus entire in the middle; POL: OOL 13: 9; eye long oval 28:15, malar space 6. Malar space 0.37x eye length. Antenna (Fig. 2b) with combined length of pedicel and flagellum (110), almost 1.27x as long as breadth of the head; flagellum 3.12x length of scape, club about 2.7 times as long as broad, about as long as 2.2 of the preceding funicular segments; F1 1.9x as long as broad, the sixth almost quadrate; scape 32, basally slightly narrow, slightly expanded medially; pedicel 9:5, 1.8x as long as wide and 0.53x as long as F1; flagellum 100; flagellum filiform, funicular segments distinctly wider than pedicel, almost in same width, gradually shortening towards tip, F1 distinctly constricted basally, 17:9, F2 12:9; F3-F4 11:9; F5-F6 9:9, quadrate; club 23:8.5, 3 segmented, acuminate, long, 1.35x as long as F1, 2.7x as long as broad, 0.76x as long as 3 preceding segments; linear sensillae on flagellar segment placed apically in a row, F1-F2 with 4, F3-F6 4-5; in apical half, C1 5; C2 5; C3 3. Scutellum almost as long as width (with axillulae) 18:17; Forewing (Fig. 3b) with stigmal vein forming 50° angle to the postmarginal vein; stigmal vein thin, long with a broad knob; costal cell 8.64 times as long as broad; post marginal vein 1.1x marginal vein and 1.4x stigmal veins; basal cell with 4-5 hairs distally, basal vein slightly indicated, speculum open; marginal vein distinctly enlarged, measurements of m: pm: st as 38: 42: 30; Propodeum with median area (20:12) at least 0.66x length of scutellum; transverse costula, plicae and median carina distinctly developed.. Metasoma 0.92x as long as mesosoma.

F e m a l e : unknown.

B i o l o g y : unknown.

C o m p a r a t i v e n o t e s : The new species similar to ♂ of *Arthrolytus oezbeki* DOĞANLAR, 1978 in having the both mandible with 3 tooth (2 teeth sharp and one tooth entire) and antenna with F1 distinctly constricted basally; distinctly wider than pedicel (at least 1.7x), combined length of pedicel plus flagellum almost 1.4x as long as breadth of head, but it differs from the ♂ of *A. oezbeki* in having malar space 0.19-0.22x eye length; forewing with stigmal vein forming 40° angle to the postmarginal vein; propodeum about 0.54x length of scutellum, median area finely reticulated; with transverse costula, plicae and median carina; median area 1.37x as wide as long; body black with bluish metallic reflection; legs with coxae concolorous with body; femora fuscous, tibiae and tarsi yellow; metasoma with a pale band basally (in *A. oezbeki* malar space more than half length of an eye; forewing with angle between stigmal and post marginal veins 32°; propodeum about 0.4x length of scutellum, median area punctured-reticulated; costula slightly indicated, plicae distinct posteriorly; median carina complete, broken medially; median area 2.5x as wide as long; body metallic green with golden reflection; femora testaceous; metasoma black).

D i s t r i b u t i o n : Canada: Ontario, Dundas.

***Arthrolytus (Anarthrolytus)* GRAHAM, 1969**

D i a g n o s i s : ♀: Right mandible with 4 teeth, left mandible with 3 teeth; Malar space at most 0.48x length of an eye; Pedicel almost as long as first funicle or slightly longer.

♂: Right mandible with 4 teeth, left mandible with 3 teeth; F1 at most slightly constricted.

ted basally; Antenna with pedicel at least slightly longer than F1 (1.1x) and distinctly narrower than F1 (at most 0.67x); Antenna with combined length of pedicel and flagellum equal to breadth of head; fore wing with a fuscous spot.

***Arthrolytus ocellus* (WALKER, 1834) (Figs 1b, 2c, 3c, d)**

Arthrolytus ocellus (WALKER, 1834), GRAHAM 1956: 254, new combination for *Eutelus ocellus* WALKER, 1834.

Type materials: *Eutelus ocellus* WALKER, 1834: 359, no types, New Lanark, Scotland. Lectotype, BMNH, United Kingdom, designated by GRAHAM 1956: 254.

Synonyms given by GRAHAM (1969), NOYES (2017).

Diagnosis: ♀: Right mandible with 4 teeth, left mandible with 3 teeth; head in dorsal view thicker antero-posteriorly, twice as broad as long or hardly more; Antenna inserted low, slightly above level of ventral edge of eyes malar space 0.33x length of an eye; Forewing (Fig. 3c, d) with stigmal vein forming an acute angle (25°) with the postmarginal vein; costal cell of fore wing 9-9.5 times as long as broad; postmarginal vein about 1.12x as long as the marginal vein, and 1.55x stigmal vein; marginal vein at the average 1.62x (with the minimum encountered 1.49x) as long as stigmal vein. Antenna (Fig. 1b) with combined length of pedicel and flagellum equal to breadth of head; flagellum 1.76x length of scape; pedicel almost as long as F1; F6 slightly transverse; club 3 segmented, acuminate, long, twice as long as width, 1.23x as long as F1. Metasoma without pale spot; Femora usually entirely pale, sometimes with a dark stripe beneath. Forewing with a broad and very intense fuscous cloud which is usually extended to the hind margin of the wing.

♂: Similar to ♀ except as follows: Antenna (Fig. 2c) with pedicel at least slightly longer than F1 (1.1x) and distinctly narrower than F1 (at most 0.67x); Forewing with stigmal vein forming 30° angle to the postmarginal vein. Antenna with pedicel twice as long as wide and 1.1x as long as F1; flagellum 2.25x length of scape, F1 1.4x; F6 0.9x as long as wide; club 1.82x as long as F1; linear sensillae funicular and club segments with at least 4-5 longitudinal sensillae; Metasoma with a pale spot or transverse band on the basal tergite.

Host: Given by several author stated in NOYES (2017).

Distribution: Andorra (ASKEWET et al. 2013), Belgium (VAGO, 2006), Croatia (BOUCEK 1977), Czech Republic (KALINA, 1989), Germany (BOUCEK 1956; 1977), Hungary (SZELENYI 1983), Moldova (BOUCEK 1965; 1966; 1977; DZHANOKMEN 1978; GRAHAM 1969), Netherlands (GIJSWIJT 2003), Romania (MITROIU 2004; 2008), Spain (ASKEWET et al. 2013; ASKEW & NIEVES ALDREY 1982; GARRIDO & NIEVES ALDREY 1990; MITROIU 2004), Sweden (THOMSON 1878; DZHANOKMEN 1978; HANSSON 1991; GRAHAM 1969; HEDQVIST 2003; BOUCEK 1966; 1977), United Kingdom (WALKER 1834; BOUCEK 1966; 1977; BOUCEK & GRAHAM 1978; GRAHAM 1969; DZHANOKMEN 1978; ASKEWET et al. 2013), England (BOUCEK 1966; DZHANOKMEN 1978).

***Arthrolytus nanus* ASKEW & NIEVES ALDREY, 1982 (Figs 1c, 2e, 3f1, f2)**

Type materials: Holotype ♀. Spain, Salamanca, Dehesa de Candelario (UTM. 30TTK6670), ex gall of *Andricus quercusradicis* (FABRICIUS) (Hym. Cynipidae) on *Quercus pyrenaica* WILLD., gall collected 19.x.1979 1-7.i.1980. Leg. J. L. Nieves, in coll. Brit. Mus. (Nat. Hist.). Paratypes:

1♀, 2♂♂, same data as holotype; 1♀, 3♂♂, same locality and host as holotype, coll. 4.x.1980, emerged x-xi. 1980, leg. J. L. Nieves; 1♂, Spain, Salamanca, Linares de Riofrio, ex gall *A. quercusradicis* coll. 28. iii.1978, emerged 7-15.vi.1978, leg. J. L. Nieves; 1♂, France, Vienne, Poitiers, ex gall *Neuroterus albipes* (SCHENCK) (Hym. Cynipidae) in second year (1969?) of gall, leg. F. Barbotin; 1♀ England, Berkshire, Wytham Wood, from soil under oak trap, 30.vii.1951, G. C. Varley. In colls. BMNH, RRA and Dept. de Zoologia of Universidad de Salamanca.

D i a g n o s i s : ♀: Forewing (Fig. 3f1) with stigmal vein forming 40° angle to the postmarginal vein; measurements of m:pm:st as 5: 6: 4; pm 1.2x as long as marginal vein, and 1.5x stigmal vein; marginal vein 1.25x as long as stigmal vein. postmarginal vein 0.7x as long as marginal vein. Head in anterior view 1.29x as broad as high; POL 1.6 OOL; malar space about 0.33x eye length. Antenna (Fig. 1c) with combined length of pedicel and flagellum equal to breadth of head; flagellum 1.63x length of scape; pedicel almost as long as the anelli plus first funicle; almost twice as long as wide and 1.5x as long as F1; F6 slightly transverse; club 2.5x as long as F1; Propodeum medially not quite 0.5 x as long as scutellum, median carina and lateral plicae indicated only anteriorly; median area about 2x as wide as long, reticulate. Forewing with a broad, arcuate, light brown band from marginal and stigmal veins, almost reaching posterior margin of wing. Legs stramineous to whitish, metallic colouration on legs absent, except on hind coxae on their outer aspects basally metallic; Body Length 1.6 mm

♂: Similar to ♀ except as follows: Antenna (Fig. 2e) with pedicel twice as long as wide, slightly longer than F1 (1.1x) and distinctly narrower than F1 (at most 0.67x); 1.2x as long as F1; flagellum 1.86x length of scape, F1 1.28x, F6 0.8x as long as wide; club 2.1x as long as F1. Forewing (Fig. 3f2) with the stigmal vein forming 47° angle to the postmarginal vein; Forewing with a fuscous spot. Legs stramineous to whitish, only hind coxae on their outer aspects basally metallic, pretarsi brown. Metasoma with basal tergite entirely pale testaceous. Body length 1.2-1.6 mm.

D i a g n o s i s : given by ASKEW & NIEVES ALDREY (1982).

H o s t s : reared from gall of *Andricus quercusradicis* (FABRICIUS) (Hym. Cynipidae) on *Quercus pyrenaica* WILLD., and from gall *Neuroterus albipes* (SCHENCK) (Hym. Cynipidae) (ASKEW & NIEVES ALDREY 1982).

D i s t r i b u t i o n : Europe: Spain, Salamanca, Dehesa de Candelario; France, Vienne, Poitiers; England, Berkshire, Wytham Wood (ASKEW & NIEVES ALDREY 1982).

***Athrohlytus glandium* BOUCEK, 1967 (Figs 1d, 2d, 3e)**

T y p e m a t e r i a l s : Holotype ♀, Slovakia: Beluja Forest near Sahy, ex acorns, 29.iii, 1954, Leg. J. Patočka, in Prague Nat. Museum (Entomology), Cat. No: 26,101. Paratypes: 1♀, same data as holotype; 1♂, Slovakia, Banska Stiavnica, ex *Balaninus* in acorns, 20.iii.1954, Leg. M. Capek.

D i a g n o s i s : ♀: Right mandible with 4 teeth, left mandible with 3 teeth; Head in anterior view 1.27x as wide as long; POL 1.7 OOL; malar space 0.44x eye length. Antenna (Fig. 1d) with flagellum 1.65x length of scape; Pedicel almost as long as first funicle; F6 0.8x as long as wide; club hardly longer than F1; Scutellum transverse, (with axillulae) 1.3x as wide as long; Forewing (Fig. 3e) with stigmal vein forming 35° angle to the postmarginal vein; post marginal vein at least as long as marginal vein. Propodeum punctured-reticulate, rather dull, only short, elevated and through a transversally rugose sculpture, differentiated nuchal part more shiny; length of propodeum medially half-length of scutellum; median carina not conspicuous. Body black with bluish metallic reflection. Legs with femora mainly infusate, metallic, except, tibiae and tarsi yellow; Metasoma without pale spot.

♂: Similar to ♀ except as follows: Antenna (Fig. 2d) with pedicel hardly 1.25x as long as wide, and 1.12x as long as F1; flagellum 1.9x length of scape, F1 twice; F6 1.2x as long as wide; club about 1.2x as long as F1. Forewing with measurements of m:pm:st as 15:17:12; pm about 1.13x as long as marginal vein, and 1.42x stigmal vein; marginal vein 1.25x as long as stigmal vein.

H o s t : Parasite of *Curculio* (= *Balaninus*) sp. (Col. Curculioniae), living in acorns. The knowledge were given by several author stated in the UCDB by Noyes (2017).

D i s t r i b u t i o n : Czechlovakia (BOUCEK 1967; DZHANOKMEN 1978; GRAHAM 1969), Europe (ASKEW & NIEVES ALDREY 1982), Slovakia (KALINA 1989), Spain (ASKEWET et al. 2013; GARRIDO & NIEVES ALDREY 1990; GOMEZ & NIEVES ALDREY 2012).

***Arthrolytus magarsosensis* nov.sp. (Figs 1e, 3g)**

T y p e m a t e r i a l s : Holotype ♀, Turkey: Adana, Karataş, 8.viii.1984, deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

E t y m o l o g y : The name is derived from the name of Magarsos, ancient city in the 7th century B.C, in Karataş, Adana.

D i a g n o s i s : ♀: Right mandible with 4 teeth, left mandible with 3 teeth; Malar space 0.37x eye length; forewing with post marginal vein about 1.5x as long as the marginal vein. Head in anterior view 1.4x as wide as long; POL 1.33 OOL; malar space 0.37x length of eye. Antenna with flagellum 2.28x length of scape; F6 almost transverse; club 1.5x as long as F1. Scutellum slightly transverse (with axillullae) 1.16x as wide as long; propodeum finely reticulate, with some fovea basally; length of propodeum medially 1/3 length of scutellum; median carina slightly developed, plicae absent.

D e s c r i p t i o n : The diagnostic characters of this species are given above and need not be repeated here. Some additional characters are the following:

♀: Body 3.0 mm long. Body black with metallic blue reflection; legs with coxae concolorous with body, femora fuscous, tibiae and tarsi yellow; scape, pedicel and anelli yellow, flagellum brown. Forewing medially pale brown, fuscous cloud of fore wing relatively narrower and less intense, often not reaching the hind margin of the wing.

Head in lateral view parallel sided, 1.4x as wide as long (50:35); in anterior view transversally oval, 1.4x as wide as long (70:50); head in dorsal view 65: 30, slightly wider than mesoscutum (57); wide of frons 45; length of eye 35; lower margin of clypeus slightly emarginated in the middle; POL 1.33x OOL; eye long oval 35:22, malar space (13) 0.37x eye; Antenna inserted low, slightly above level of ventral edge of eyes. Flagellum 2.28x length of scape; club acuminate, short, 1.5x as long as F1. Antenna (Fig. 1e) with scape 43, in anterior view its anterior margin slightly convex, posterior margin almost straight; pedicel 15, almost twice as long as wide and as long as F1; flagellum 98, 2.28x length of scape, filiform; funicular segments gradually decreasing in length, F1 15, F6 10x as long as wide; club acuminate, short, 1.5x as long as F1.

Mesosoma (41) as wide as head, 1.4x as long as width; as wide as metasoma. Scutellum slightly transverse (with axillullae 35:30), frenal carina distinct laterally; Forewing (Fig. 3g) with stigmal vein forming 35° angle to the postmarginal vein; marginal vein slightly enlarged, stigmal vein relatively long with a broad knob; measurements of m:pm:st as 37: 55: 42; post marginal vein about 1.5x as long as the marginal vein, 1.3x as long as

stigmal vein; marginal vein 0.9x as long as stigmal vein. Propodeum finely reticulate, with some fovea basally; length of propodeum medially inferior to 1/3 length of scutellum; median carina slightly developed, plicae absent.

Metasoma (53) 1.3x as long as length of mesosoma.

♂: unknown.

Comparative notes: In the subgenus *Anarthrolytus*, *Arthrolytus magarsosensis* nov.sp. is similar to *A. nanus* ASKEW & NIEVES ALDREY, 1982 and *A. glandium* BOUCEK, 1967 in having forewing with stigmal vein forming at least 35° angle with the postmarginal vein. But it differs from *A. nanus* in having forewing with stigmal vein forming 35° angle to the postmarginal vein; malar space 0.37x eye length and legs with coxae and femora dark bluish-green (in *A. nanus* forewing with stigmal vein forming 40° angle to the postmarginal vein; malar space about 0.33x eye length and Legs stramineous to whitish). *A. magarsosensis* nov.sp. also differs from *A. glandium* in having malar space 0.37x eye length; forewing with post marginal vein about 1.5x as long as the marginal vein; POL 1.33 OOL; antenna with flagellum 2.28x length of scape; club 1.5x as long as F1 and other characters given in the key (in *A. glandium* malar space 0.44x eye length; forewing with post marginal vein almost as long as marginal vein; POL 1.7 OOL; antenna with flagellum 1.65x length of scape; club hardly longer than F1).

Arthrolytus (Arthrolytus) s. str.

Diagnosis: ♀: Right mandible with 4 teeth, left mandible with 3 teeth; F1 distinctly constricted basally; Pedicel distinctly shorter than F1.

♂: Right mandible with 4 teeth, left mandible with 3 teeth; F1 at most slightly constricted basally; Antenna with pedicel distinctly shorter than F1 (at least 0.83x) and almost as wide as F1; Combined length of pedicel and flagellum at least 1.2 times the breadth of the head.

***Arthrolytus muesebecki* BURKS, 1969**

Type materials: Holotype ♀. New species, USNM, United States of America, California; 4♀♀ paratypes in Davis collection in the University of California.

Diagnosis: ♀: Clypeal margin obscurely bi-dentate; malar space about 0.33x eye height. Right mandible with 4 teeth, left mandible with 3 teeth; forewing without marginal ciliae. POL 1.5x OOL. Antenna with flagellum 1.72x length of scape; pedicel distinctly shorter than F1, F6 almost transverse; club almost as long as F1. Relative measurement of antenna: scape 47; pedicel 14; F1 19; F2 11; F3 10; F4 9; F5 8; F6 7; club 18. flagellum 81; Forewing with submarginal vein 2.6x as long as marginal vein; stigmal and marginal vein equal; post marginal vein slightly longer than marginal vein; propodeum without transverse costula; Body black; antenna with scape pale, flagellum dark; forewing hyaline; pedicel and legs beyond coxae tan; metasoma light coloured at base; metasoma 1.66x as long and wide as mesosoma. Body 3.5-5.0 mm.

♂: Similar to ♀ except as follows: Head and mesosoma green, metasoma brown, with yellow cross-band near base, antennal scape yellow, pedicel tan; flagellum dark brown; fore wing hyaline; coxae concolorous with body, legs beyond coxae tan; Antenna with pedicel 0.45x as long as F1; flagellum 2.43x length of scape, club slightly shorter than F1. Relative measurement of antenna: scape 37; pedicel 9; F1 20; F2 12; F3 10; F4 10; F5 9;

F6 8; club 18. Metasoma as long as mesosoma. Body 3.0-3.5 mm.

H o s t : Reared from gall of *Andricus brunneus* Fullaway on blue oak, *Quercus douglasii* by C. Dailey. This parasite was reared from cynipid galls, but it is not certain that it was parasitic on the gall makers. Some of galls from which specimens emerged showed evidence that lepidopterous larvae had also lived as inquilines in the galls (BURKS, 1969).

D i s t r i b u t i o n : USA. California: Folsom Lake, Placer Co. (BURKS, 1969).

***Arthrolytus megaspilus* (WALKER, 1874)**

Arthrolytus megaspilus (WALKER, 1874), GRAHAM (1969: 795), new combination for *Pteromalus megaspilus* WALKER, 1874.

T y p e m a t e r i a l s : Lectotype, ♀, BMNH, Russia-Amur Oblast, designated by GRAHAM (1969: 795).

D i a g n o s i s : ♀: Right mandible with 4 teeth, left mandible with 3 teeth; Fore wing with marginal ciliae; Body greenish-black black, legs reddish, Forewings with a very large blackish spot in the disk, veins tawny; metasoma purplish cupreus, antennae with scape and F1 dark reddish, rest of segments black. Head in dorsal view 2.15 times as broad as long, a little broader than mesosoma. Head and mesosoma very finely punctured, panels of median area of propodeum rather more finely reticulate; antennae stout, subclavate, much shorter than mesosoma; Metasoma sessile, smooth, oval, acute at tip, shorter but hardly narrower than mesosoma, keeled beneath.

H o s t : unknown.

D i s t r i b u t i o n : Russia: Amur Oblast (WALKER 1874).

***Arthrolytus discoideus* (NEES, 1834) (Figs 1f, 2g, 3h, i)**

Arthrolytus (Arthrolytus) discoideus (NEES, 1834), GRAHAM (1969: 795), new combination for *Pteromalus discoideus* NEES, 1834.

T y p e m a t e r i a l s : Holotype ♀, new species, Lectotype. ♀, HDU, Germany, designated by GRAHAM (1969: 795).

M a t e r i a l e x a m i n e d : 1♀, England: London, Gladstonepark, 26.vii. 1981, Leg. M. Doğanlar; 1♂, Turkey: Erzurum, 26.vi.1989, Leg. H. Özbek.

S y n o n y m s : given by GRAHAM (1969), NOYES (2017).

D i a g n o s i s : ♀: Head in dorsal view 2.0-2.1 times as broad as long; in frontal view 1.33x as broad as long; malar space 0.31x as long as eye height; POL 1.9 OOL. Antenna with (Fig. 1f) combined length of pedicel plus flagellum 1.81x as long as scape; usually slightly less than the breadth of the head; flagellum 1.9x length of scape; anelli plus F1 1.55x as long as pedicel; club 1.35x longer than F1 F1 1.83x as long as broad (20:14); F5-F6 distinctly transverse (12:17). Linear sensillae on F1 3, in 2 rows; F2-F6 4-5 in 2 rows, (3-2 apically, 1-2 basal half); C1-C2 6 in a row, C3 4 in a row. Forewing (Fig. 3h) with stigmal vein forming an acute angle (30°) with the postmarginal vein; with black spot; submarginal vein 1.67x as long as marginal vein; marginal vein 1.3x stigmal vein; post marginal vein 1.43x stigmal vein. Antennae with combined length of pedicel and flagellum usually slightly less than breadth of head. Propodeum with panels of median area rather more coarsely reticulate, without transverse costula and median carina, lateral carina distinct basally. Body black, legs with coxae concolorous with body, femora, tibiae and tarsi yellow; Metasoma dark brown, basal tergite dark testaceous; Metasoma

1.7x as long as broad, at least very slightly longer than head plus mesosoma; 1.3x longer than mesosoma; 1.22x as wide as mesosoma. Body 2.75 mm. in length.

♂: Head in lateral view 1.8x as long as width; in anterior view 1.28x as wide as high; in dorsal view 2.4x as wide as long, 1.15x wider than mesoscutum; in anterior view wide of frons 2.06x width of eye; lower margin of clypeus entire; POL 2x OOL; eye 1.38x as long as width; Malar space 0.36x eye length. Antenna (Fig. 2g) with scape 0.9x length as F1; pedicel 0.8x as long as wide and 0.2x as long as F1; flagellum 6.94x length of scape, F7 2.5-2.62x as long as wide; club 0.75x as long as F1; linear sensillae on F1 2; F2 3; F3 3; F4-F7 4, C1 3; C2 1. Scutellum 1.22x longer than broad. Forewing (Fig. 3i) with stigmal vein forming 40° angle to the postmarginal vein; costal cell 9.0-9.5 times as long as broad, without fuscous cloud; speculum bare or nearly so; postmarginal vein about 0.77x as long as the marginal vein, 1.11x as long as stigmal vein; marginal vein 1.44x as long as stigmal vein. Propodeum finely reticulate, without fovea basally; Length of median areae 0.35x length of scutellum; median carina, lateral carina and costula developed. Body black with bluish metallic reflection; legs with coxae concolorous with body, fore and mid femora in basal half, hind femora wholly fuscous, tibiae and tarsi yellow, Metasoma with a pale band on second tergite.

H o s t : unknown.

D i s t r i b u t i o n : Europe: Belgium (VAGO 2006), Caucasus (DZHANOKMEN 1978; MITROIU 2004), Czech Republic (KALINA 1989; MITROIU 2004), Germany (NEES 1834; GRAHAM 1969; VIDAL 2001; MITROIU 2004), Netherlands (GIJSWIJT 2003), Romania (MITROIU 2004; 2008), Slovenia (BOUCEK 1977; MITROIU 2004), Spain (GARRIDO TORRES & NIEVES ALDREY 1999; MITROIU 2004), Sweden (THOMSON 1878; HANSSON 1991; GRAHAM 1969; HEDQVIST 2003; MITROIU 2004), Turkey (ÖNCÜER 1991; MITROIU 2004), United Kingdom (WALKER 1839; BOUCEK & GRAHAM 1978; GRAHAM 1969; MITROIU 2004).

***Arthrolytus geyrazensis* nov.sp. (Figs 2h, 3p)**

T y p e m a t e r i a l s : Holotype ♂, Turkey: Tokat, Geyraz, 01.vi.1989, Leg. H. Çam, deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC). Paratype: 1♂, same data as the holotype.

E t y m o l o g y : The name is derived from the name of Geyraz, Tokat, from which the holotype was collected.

D i a g n o s i s : ♂: Antenna with scape as long as F1; pedicel 1.25x as long as wide and 0.3x as long as F1; flagellum 6.35x length of scape; F7 as long as wide; club 0.88x as long as F1; linear sensillae on F1 absent; F2 1; F3 2; F4-F6 3; F7 2; C1 3; C2 1. Head in lateral view 1.6x as long as width; 1.3x wider than mesoscutum; in anterior view wide of frons 1.87x width of eye; lower margin of clypeus slightly emarginated in the middle; eye 1.33x as long as width; Scutellum slightly transverse 1.11x as wide as long; propodeum with costula distinct, median carina absent, plicae developed. Fore wing with stigmal vein forming 50° angle to the postmarginal vein; with speculum narrow, narrowly opened; basal vein distinct, with hair line; basal cell with some hairs; postmarginal vein about 0.6x as long as the marginal vein; 1.27x as long as stigmal vein; marginal vein 2.1x as long as stigmal vein. Legs fuscous with metallic reflexion, except tips of femora, tibiae and tarsi yellow.

Description: The diagnostic characters of this species are given above and need not be repeated here. Some additional characters are the following:

♂: Body 2.2 mm long. Body black with bluish metallic reflection, Metasoma basally on second tergite with pale band; legs fuscous with metallic reflexion, excepts trochanters, tips of femora, tibiae and tarsi yellow, forewing hyaline, veins pale brown; metasoma on the second tergite with pale band.

Head in lateral view (27:17) 1.6x as long as width; in anterior view (32:41) 1.28x as wide as high; in dorsal view (43: 18) 2.4x as wide as long 1.3x wider than mesoscutum (33); wide of frons (28) 1.87x width of eye length of eye 20; lower margin of clypeus slightly emarginated in the middle; POL 2x OOL; eye long oval (20:15) 1.33x as long as width; malar space (8) 0.4x eye length. Antennae (Fig. 2h) with 7 funicular segments and a 2-segmented clava, with scape in anterior view its anterior margin slightly convex, posterior margin almost straight, hardly expanded in its upper half, the subapical shiny boss tending to be indistinct. Antenna with scape (17) as long as F1; in anterior view scape hardly expanded in its upper half, the subapical shiny boss tending to be indistinct, posterior margin almost straight; pedicel (5) 1.25x as long as wide and 0.3x as long as F1; flagellum (108) 6.35x length of scape, filiform; funicular segments gradually decreasing in length, F1 17, F2 15; F3 13; F4 12; F5 11; F6 10; F7 (8) as long as wide; club (15) 2 segmented, acuminate, short, 0.88x as long as F1; linear sensillae on F1 absent; F2 1; F3 2; F4-F6 3; F7 2; C1 3; C2 1.

Mesosoma slightly narrower than head (22:25) 1.6x as long as width; Scutellum slightly transverse (with axillulae 20:18) 1.11x as wide as long; Forewing (Fig. 3p) with stigmal vein forming 50° angle to the postmarginal vein; costal cell 10 times as long as broad; speculum narrow, narrowly opened; basal vein distinct, with hair line; basal cell with some hairs; marginal vein slightly enlarged, stigmal vein thin, long with a broad knob; measurements of m:pm:st as 23: 14: 11; pm about 0.6x as long as the marginal vein; 1.27x as long as stigmal vein; marginal vein 2.1x as long as stigmal vein. Propodeum finely reticulate medially; length of propodeum medially inferior to 0.4x length of scutellum; median area 1.72x as wide as long (31:18) costula distinct, median carina absent, plicae distinctly developed.

Metasoma 0.75x as long as mesosoma; about twice as long as width.

♀: unknown

Comparative notes: *Arthrolytus geyrazensis* nov.sp. is similar to *A. discoideus* (NEES, 1834) in having fore wing with marginal ciliae; antennae with 7 funicular segments and a 2-segmented clava, with scape in anterior view its anterior margin slightly convex, posterior margin almost straight, hardly expanded in its upper half, the subapical shiny boss tending to be indistinct. But it differs from *A. discoideus* in having Antenna with pedicel 1.25x as long as wide; F7 as long as wide; linear sensillae on F1 absent; F2 1; F3 2; F4-F6 3; F7 2; C1 3; C2 1. Head in dorsal view 1.3x wider than mesoscutum; propodeum without median carina; Fore wing with stigmal vein forming 50° angle to the postmarginal vein; marginal vein 2.1x as long as stigmal vein (in *A. discoideus* antenna with pedicel 0.8x as long as wide; F7 2.5-2.62x as long as wide; linear sensillae on F1 2; F2 3; F3 3; F4-F7 4, C1 3; C2 1; head in dorsal view 1.15x wider than mesoscutum; propodeum with median carina; Forewing with stigmal vein forming 40° angle to the postmarginal vein; marginal vein 1.44x as long as stigmal vein).

***Arthrolytus fasciatus* (PROVANCHER, 1881)**

Arthrolytus fasciatus (PROVANCHER, 1881), BURKS (1963: 1262), new combination for *Semiotellus fasciatus* PROVANCHER 1881.

T y p e m a t e r i a l s : *Semiotellus fasciatus* PROVANCHER, 1881: 294. Lectotype, MPQC, Canada, designated by GAHAN & FAGAN (1918)

D i a g n o s i s : ♀: Antenna with combined length of pedicel plus flagellum 2.2x as long as scape; Forewing shaded behind marginal vein; all legs beyond coxae yellow. Malar space 0.33x as long as eye height; POL 1.5 OOL; Antenna with anelli plus F1 1.4x as long as pedicel; club slightly shorter than F1 (15:17); flagellum 1.86x length of scape. Forewing with submarginal vein 2.5x as long as marginal vein; stigmal and marginal vein equal; post marginal vein 1.2x as long as marginal vein; propodeum with lateral carina interrupted in the middle, a transverse costula present midway between base and apex of propodeum; surface of propodeum anterior to this costula sculptured, surface posterior to costula smooth and shining; strong median carina present. Metasoma as wide as mesosoma

♂: Similar to ♀ except as follow: The antennal measurement taken from figure 331 of Boucek & Heydon (1997) as follows: Antenna: scape 15, basally slightly narrow, slightly expanded medially; pedicel 4:2.5 1.6x as long as wide and 0.44x as long as F1; flagellum 47.5, 3.16x length of scape, filiform; funicular segments slightly wider than pedicel, almost in same width, gradually shortening towards tip, F1 9:3, F2 6.5:3; F3-F5 5.5; F6 4.5:3, 1.5x as long as width; club 9.5:3, 3 segmented, acuminate, long, as long as F1, 3.16x as long as broad; linear sensillae on F1-F6 3-4, in one row apically; C1 3; C2 3; C3 2. (Measurements given by Burks (1969): Antenna with proportional lengths of partscape 25; pedicel 7; F1 16; F2 10; F3 9; F4 9; F5 8; F6 8; Club 15).

D e s c r i p t i o n : given by BURKS (1969).

H o s t : unknown.

D i s t r i b u t i o n : Canada: (PROVANCHER 1881), Quebec (BURKS 1969), USA: Massachusetts, New Hampshire, Pennsylvania (BURKS 1969).

***Arthrolytus usubai* KAMIJO, 1981 (Figs 1g, 2k, 3j)**

T y p e m a t e r i a l s : Holotype ♀, Kita-Asaka, Saimata-ken, emerged -.iv. 1980, ex gall of *Neuroterus* sp., Leg. S. Usuba. Paratypes: Honshu: 11♀♀ 13♂♂, same data as the holotype; Urawa, Saitama-ken, emerged -. Xii. 1978. Leg. S. Usuba. The types were deposited in the Entomological Institute, Hokkaido University, Sapporo.

D i a g n o s i s : ♀: Antenna (Fig. 1a) with combined length of pedicel and flagellum equal to breadth of the head; 2.3x as long as scape. anelli plus F1 1.44x as long as pedicel; pedicel 0.82x as long as F1; club 1.64x as long as F1. Malar space 0.30x length of an eye. POL 1.8 OOL. Forewing (Fig. 3j) with stigmal vein forming angle 45° with the postmarginal vein; marginal vein 1.3-1.5x stigmal vein; post marginal vein 0.9x as long as marginal vein. Propodeum medially 0.33x as long as scutellum, median area transversally elevated and finely strigose-reticulate, with apical and basal foveae deep and large; with distinct median carina, plicae sherp posteriorly, indicated anteriorly by basal foveae; nucha occupying 1/4 median length of propodeum, well defined in front, weakly and transversally sculptured. Legs brownish yellow, except coxae concolorous with mesosoma; tarsi darker at apex.

♂♂: Similar to ♀ except as follows: Anterior margin of clypeus truncate; Antenna (Fig.

2k) with pedicel 1.7-1.9x as long as broad, 0.6x as long as F1; flagellum 2.68x length of scape; F1 2.28x as long as broad 1.78x as long as pedicel; 1.23x as long as F2; F6 1.33x as long as broad; club 3.13x as long as broad 1.56x length of F1. Number of linear sensillae on F1 and F2 1; F3 2; F4 and F6 3-4; C1 and C2 3 sensillae; Propodeum with median carina strong, plicae sharp posteriorly, indicated anteriorly by basal foveae; dorsum of Metasoma with a large brown spot basally; forewing with a cloud slightly darker.

Description: given by KAMIJO (1981).

Host: reared from galls of *Neuroterus* sp. on leaves of *Quercus acutissima*.

Distribution: Japan: Honshu.

***Arthrolytus yazicioğlu* nov.sp. (Figs 1h, 2n, 3k)**

Type materials: Holotype ♀, Turkey: Tokat, 6.viii. 1986, Leg. M. Doğanlar, deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC). Paratypes: 2♂♂, same data as the holotype.

Etymology: The name is derived from the name of Mr. Recep Yazicioğlu who was the governor of Tokat, who helped me during my works in Tokat.

Diagnosis: ♀: Fore wing with stigmal vein forming an acute angle (30°) with the postmarginal vein; Antenna with combined length of pedicel plus flagellum 2.57x as long as scape; with anelli plus F1 2.25x as long as pedicellus; F6 distinctly transverse. club 1.67x as long as F1. flagellum 1.97x length of scape; POL 1.6 OOL; Forewing without black spot; with submarginal vein 1.71x as long as marginal vein; marginal vein 1.3x stigmal vein; post marginal vein equal to marginal vein. Propodeum without transverse costula, median and plicae. Metasoma fuscous, basally slightly paler 1.95x as long as broad 1.2x longer than mesosoma, as wide as mesosoma

♂: Similar to ♀ except as follows: Antenna with combined length of pedicellus and flagellum 1.26 times the breadth of the head; flagellum 4.25x length of scape; the latter almost parallel sided; pedicel 1.4x as long as wide; F1 1.2x as long as pedicel; F2 1.63x; club about 2.67 times as long as broad;. Linear sensillae on flagellar segment as: F1 1; F2 3; F3 3; F4 and F6 3-4; C1, C2 3; and C3 3 in a row; Head in lateral view 1.6x as height as long; eye long oval 1.31x as long as width; POL 1.43x OOL. Forewing with stigmal vein forming 45° angle to the postmarginal vein; the latter 1.06x marginal vein and 1.25x stigmal veins; marginal vein 1.15x stigmal vein; basal cell with 4-5 hairs distally, basal vein distinctly indicated, speculum open; Propodeum with median area about 0.8x length of scutellum; with plicae complete. femora testaceous, tibiae and tarsi yellow. Metasoma 0.72x as long as mesosoma.

Description: The diagnostic characters of this species are given above and need not be repeated here. Some additional characters are the following:

♀: Body 1.75 mm. Head and mesosoma black, with metallic reflection; antennal scape pale, pedicel and flagellum brown, legs with coxae femora concolorous with body, mid and hind tibiae fuscous dorsally and yellow ventrally, fore tibiae and tarsi yellow; metasoma fuscous, basal tergite testaceous. forewing hyaline, shaded behind marginal vein.

Head in lateral view 1.6x as height as long; head in dorsal about 2.63 times as broad as its maximum length; in dorsal view 1.15x width of mesoscutum; eye long oval 1.31x as long as width; POL 1.6x OOL. Malar space 0.37x eye length.

Antenna (Fig. 1h) with combined length of pedicel plus flagellum slightly more than the breadth of the head (1.1). and 2.57x as long as scape; with anelli plus F1 2.25x as long as pedicel; F2 slightly longer than broad (10:9); F3 quadrate; F4 slightly, F5-F6 distinctly transverse; club 1.95x as long as broad 1.67x as long as F1. flagellum 1.97x length of scape; Relative measurement of antenna: scape 38; pedicel 13; F1 12; F2 10; F3 9; F4-F5 8; F6 6; club 20. Linear sensillae on F1-F2, 3 in a row; F3-F6 4-5 in a row, C1-C2 6 in a row, C3 4 in a row. Forewing (Fig. 3k) with; costal cell 9.0-9.5 times as long as broad. with submarginal vein 1.71x as long as marginal vein; marginal vein 1.3x stigmal vein; post marginal vein equal to marginal vein, basal cell with 4-5 hairs distally, basal vein distinctly indicated, speculum open; Propodeum with median area 0.8x length of scutellum; transverse costula; median and plicae slightly developed. Metasoma 1.95x as long as broad 1.2x longer than mesosoma, as wide as mesosoma.

♂: Similar to ♀ except as follows: Body 1.63 mm long. body black with bluish metallic reflection, Metasoma black, without pale spot; legs with coxae, concolorous with body; antenna with scape, pedicel and anelli fuscous, funicular segments and club black; forewing hyaline.

Head in lateral view 32:20; in anterior view 40:32 1.25x as wide as height; in dorsal view 40: 20 1.15x wider than mesoscutum (35); wide of frons 28; lower margin of clypeus slightly emerginated in the middle; eye long oval 17:13, malar space 6. Malar space 0.35x eye length.

Antenna (Fig. 2n) with scape (24); flagellum (102), filiform, funicular segments as wide as pedicel, almost in same width, gradually shortening towards tip, with pedicel 0.8x as long as F1; the latter slightly constricted basally, (14:8) 1.75x as long as broad; F2 (13:8), F3-F4 1.43x, F5 1.13x as long as broad, F6 (9:8) 1.13x as long as broad; club 1.7x as long as F1; almost as long as combined length of F5+F6, about 0.75x of 3 preceding funicular segments.

Forewing with stigmal vein thin, long with a broad knob; Scutellum almost as long as width (with axillulae) 15:16; Forewing with costal cell 11.33 times as long as broad; marginal vein distinctly enlarged, measurements of m: pm: st as 33: 35: 28; Propodeum (22:12), with median area 1.83x as wide as median length, plicae complete, median carina and basal fovea absent. Metasoma narrower than mesosoma.

Comparative notes: ♀: *Arthrolytus yazicioglu* nov.sp. is similar to *Arthrolytus gurderei* nov.sp., *Arthrolytus slovacus* GRAHAM, 1969 and *Arthrolytus kahvecii* nov.sp. in having legs with coxae and femora mostly black, concolorous with body, at most tips of femora and tibiae and tarsi pale coloroud. But it differs from 3 species in having fore wing with stigmal vein forming an acute angle (30°) with the postmarginal vein (in the 3 species forewing with stigmal vein forming at least 35° angle with the postmarginal vein). *A.yazicioglu* nov.sp. differs from *A. gurderei* nov.sp. in having antenna with anelli plus F1 2.25x as long as pedicel; flagellum 1.97x length of scape; POL 1.6 OOL; forewing marginal vein 1.3x stigmal vein; post marginal vein equal to marginal vein. (in *A. gurderei* nov.sp.; antenna with anelli plus F1 1.32x as long as pedicel; flagellum 2.23x length of scape; POL 1.9x OOL; Forewing with marginal vein 1.94x stigmal vein; post marginal vein 1.35x marginal vein). *A.yazicioglu* nov.sp. differs from *A. slovacus* and *A. kahvecii* n.sp in having head in dorsal about 2.63 times as broad as its maximum length; (in *A. slovacus* head in dorsal about 2.25 times as broad as its maximum length; *A. kahvecii* nov.sp. head in dorsal about 2.31 times as broad as its

maximum length); metasoma fuscous, basal tergite testaceous (in *A. slovacus* metasoma with a yellowish band across the basal tergite; venter extensively pale; in *A. kahvecii* nov.sp. metasoma testaceous with bluish reflection), and also more characters stated in the key.

In ♂: *Arthrolytus yazicioglu* nov.sp. similar to *Arthrolytus nuridemiragi* n.sp. club at most 2.94x times as long as width (in other species with club at least 3.13x as long as width as seen in the key). The new species differs from *A. nuridemiragi* nov.sp. in having club 2.67 times as long as width; antenna with combined length of pedicellus and flagellum 1.26 times the breadth of the head; flagellum 4.25x length of scape; POL 1.43x OOL (in *A. nuridemiragi* nov.sp. club about 2.94 times as long as broad; antenna with combined length of pedicel and flagellum almost as long as breadth of the head; flagellum 3.2x length of scape; POL 1.9x OOL), and more characters given in the key.

***Arthrolytus gurderei* nov.sp. (Figs 1i, 3l)**

T y p e m a t e r i a l s : Holotype ♀, Turkey: Tokat, Almus, side of lake, 7.v.1988, deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

E t y m o l o g y : The name is derived from the name of Mr. Metin Gürdere who was a government minister of Turkey and made many invaluable works for Tokat, helped me during my works in Tokat.

D i a g n o s i s : ♀: Head in dorsal view 2.22x as broad as long; hardly protuberant at level of toruli; with temples 0.46x as long as eyes. OOL 1.8x POL; Malar space at least 0.39x length of an eye. Antennae inserted well above level of ventral edge of eyes, their toruli about equidistant from the anterior margin of the clypeus and the median ocellus; combined length of pedicel and flagellum almost as the breadth of the head; antenna with anelli plus F1 1.32x as long as pedicel; flagellum 2.23x length of scape; club 1.6x length of F1; pedicel 0.63x as long as anelli plus first funicle; Forewing with a faint infumate discal cloud; with marginal vein 1.94x stigmal vein and 1.37x post marginal vein; the latter 1.46x stigmal vein; angle between stigmal vein and postmarginal vein forming 35°; speculum and basal cell open; Propodeum with transverse costula, median and plicae; (medially) 0.73x as long as scutellum; its median area about 1.26 times as broad as long. Metasoma without pale spot.

D e s c r i p t i o n : The diagnostic characters of this species are given above and need not be repeated here. Some additional characters are the following:

♀: Body 2.43 mm. Body black, with metallic copery reflection, Metasoma without pale spot, antennal scape and pedicel and anelli yellow, flagellum dark, legs with coxae and femora fuscous, tibiae testaceous; tarsi yellow, pulvilli black.

Head in lateral view 1.83x as height as length; in frontal view 1.2x as wide as height; width of frons 2.67x as wide as width of eye; the latter 1.35x as long as width; anterior margin of clypeus entire. Antenna (Fig. 1i) with F1 1.8x as long as broad, distinctly constricted basally; F2 1.18x longer than broad; F3 slightly longer than broad; F4-F5 quadrate, F6 slightly transverse. Relative measurement of antenna: scape 50; pedicel 20; F1 18; F2 14; F3 13; F4-F5 11; F6 9; club 29.

Mesosoma almost 1.5x as long as width; 1.25x as long as metasoma; scutellum as long as width Forewing (Fig. 3l) with costal cell of fore wing 11 times as long as broad; sub-marginal vein 1.36x as long as marginal vein;

Metasoma 1.12 times as long as broad, 0.71x as long as head plus mesosoma, 0.94x as long as mesosoma 1.75x wider than mesoscutum.

♂: unknown.

Comparative notes: *Arthrolytus gurderei* nov.sp. is similar to *Arthrolytus slovacus* GRAHAM, 1969 and *Arthrolytus kahvecii* nov.sp. in having antennae inserted well above level of ventral edge of eyes, their toruli about equidistant from the anterior margin of the clypeus and the median ocellus; head hardly protuberant at level of toruli; head in dorsal strongly transverse, at least 2.25 times as broad as its maximum length, with temples hardly one sixth as long as eyes; pedicel 0.63-0.75x as long as anelli plus first funicle; forewing without black spot or at most with a faint infumate discal cloud. But *A. gurderei* differs from both of them in having malar space at least 0.39x length of an eye; head in dorsal view 2.43x as broad as long; Metasoma without pale spot (in both species malar space hardly one third length of an eye; head in dorsal view at most 2.31x as broad as long; wings slightly yellowish, with a faint infumate discal cloud).

***Arthrolytus slovacus* GRAHAM, 1969 (Figs 1j)**

Type materials: Holotype ♀, Czechoslovakia: Southern Slovakia, Kovakov, 07.vi. 1958. Leg. A. Hoffer, in Graham Collection. Paratype ♂, Czechoslovakia: Moravia, Pavlovske Kopce, 06.v.1961. Leg. A. Hoffer.

Diagnosis: ♀: Head in dorsal about 2.25 times as broad as its maximum length; malar space hardly one third length of an eye. Antenna (Fig. 1j) with combined length of pedicel and flagellum 1.3-1.4x as long as the breadth of the head; anelli plus F1 1.53x as long as pedicel; flagellum 2.5x length of scape, club slightly shorter than length of F1. Forewing with marginal vein 1.8x as long as stigmal vein, and slightly longer than post marginal vein. Propodeum (medially) hardly half as long as scutellum; its median area about 1.8 times as broad as long, the panels finely reticulate. Wings slightly yellowish, with a faint infumate discal cloud. Metasoma with a yellowish band across the basal tergite; venter extensively pale.

♂: Similar to ♀ except as follows: Antenna with pedicel only about 1.5 times as long as broad, somewhat shorter than the first funicular segment; flagellum distinctly stouter than pedicel, latter as seen in dorsal view; F1 at most twice as long as broad, the sixth at most slightly longer than broad; club about 3.5 times as long as broad, about as long as 2.5x of the preceding funicular segments; mesosoma nearly 1.6 times as long as broad. Median area of propodeum only about 1.5 times as broad as long, reticulate, with complete plicae; forewing immaculate; pedicel brown; all coxae mainly black. Metasoma oval, as long as but narrower than mesosoma; blackish with a yellowish spot on the basal tergite.

Description: given by GRAHAM (1969).

Host: unknown.

Distribution: Czechoslovakia: Slovakia, Moravia, GRAHAM (1969).

***Arthrolytus kahvecii* nov.sp. (Figs 1k, 3m)**

Type materials: Holotype ♀, Turkey: Tokat, Fidanlık 14.vi.1989, deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

E t y m o l o g y : The name is derived from the name of Mr. Adnan Kahveci who was the minister of Turkey for his invaluable works in the Blacksee Region of Turkey.

D i a g n o s i s : ♀: Head hardly protuberant at level of toruli; Head in dorsal about 2.67 times as broad as length. Antennae inserted well above level of ventral edge of eyes, their toruli about equidistant from the anterior margin of the clypeus and the median ocellus; Malar space hardly one third length of an eye. Antenna with combined length of pedicel and flagellum almost as long as the breadth of the head; flagellum 2.24x length of scape; pedicel 0.71x as long as anelli plus first funicle; club 1.57x as long F1. Propodeum medially 0.33x as long as scutellum; its median area about 2.5x as broad as long, the panels distinctly reticulate. Wings slightly yellowish, with a faint infumate discal cloud. Metasoma testaceous with bluish reflection.

D e s c r i p t i o n : The diagnostic characters of this species are given above and need not be repeated here. Some additional characters are the following:

♀: Body 2.63 mm. Head and mesosoma black with metallic blue reflection.

Malar space hardly one third length of an eye (0.31x). Antennae inserted well above level of ventral edge of eyes, their toruli about equidistant from the anterior margin of the clypeus and the median ocellus; head hardly protuberant at level of toruli.

Antenna (Fig. 1k) with scapus 58, almost parallel sides, slightly narrower basally; pedicel (18) 1.8x as long as wide and 0.82x as long as F1; flagellum (130), 2.24x length of scape, almost filiform; funicular segments F2-F6 slightly decreasing in length, F1 22, F2 17; F3 16, F4 15; F5 14, F6 12, as long as wide; club 30, acuminate, short 1.36x as long F1; sensillae 3-4, disposed in a row, on apical half of each segment.

Mesosoma squat, about 1.1 times as long as broad, 0.71x as long as metasoma. Forewing (Fig. 3m) with angle between stigmal and post marginal veins 55° ; submarginal vein 1.33x as long as marginal vein; marginal vein as long as post marginal vein, post marginal vein 1.43x marginal vein.

Metasoma 1.81 times as long as broad 1.17x as long as head plus mesosoma 1.5x as long as mesosoma 1.21x wider than mesosoma.

♂: unknown.

C o m p a r a t i v e n o t e s : *Arthrolytus kahvecii* nov.sp. similar to *A. slovacus* GRAHAM 1969 and *A. gurderei* nov.sp. Discussion was given above.

***Arthrolytus maculipennis* (WALKER, 1835) (Figs 11-n; 2f, 3n)**

Arthrolytus maculipennis (WALKER, 1835), MASI (1925: 32), new combination for *Pteromalus maculipennis* WALKER, 1835.

T y p e m a t e r i a l s : *Pteromalus maculipennis* WALKER, 1835: 191. New species, Lectotype, ♀, BMNH, United Kingdom.

S y n o n y m s : given by GRAHAM (1969), NOYES (2017).

D i a g n o s i s : ♀: Antenna (Fig. 1n) with anelli plus F1 2.4x as long as pedicellus; F1 2.21x as long as width; F2 slightly longer than width; F3 quadrate; F4 slightly, F5-F6 distinctly transverse. club 0.88x as long as F1. Malar space hardly one third length of an eye; Forewing (Fig. 3n) with stigmal vein forming an less acute angle 40° with the post-marginal vein; costal cell of fore wing 10.5-11 times as long as broad; sometimes relatively longer; submarginal vein 1.63x as long as marginal vein; marginal vein 1.57x

stigmal vein; post marginal vein equal to marginal vein. Propodeum with transverse costula, median and plicae. Metasoma 1.3x longer than as mesosoma. Antennal scape and pedicel pale, flagellum dark; mesosoma black, forewing with black spot; Metasoma often with a pale transverse band on the basal tergite, sometimes the whole base yellowish. Legs with coxae and femora mostly black, concolorous with body, at most tips of femora and tibiae and tarsi pale coloroud.

♂: Similar to ♀ except as follows: Antennae (Fig. 2f; Fig. 289 of BOUCEK & RASPLUS (1991) with all 9 flagellar segments separated by peduncles, therefore no club is differentiated; combined length of pedicel and flagellum 2.1-2.75 times the breadth of the head; segments of funicle elongate, the first 3.5-5.5 times, the seventh 1.8-3.0 times as long as broad; scape 11, in anterior view its anterior margin distinctly convex, posterior margin almost straight; distinctly expanded in its upper half, where there is a distinct shiny boss on its outer aspect; pedicel 1.5x as long as wide and 0.26x as long as F1; flagellum 70, 6.36x length of scape, filiform; funicular segments gradually decreasing in length, F1 11.5; F2 9; F3 7.5; F4 7; F5 7; F6 6.5; F7 5, 2.5x as long as wide; F8 4.5; F9 6 (=club 1 segmented), acuminate, short, 0.52x as long as F1; linear sensillae on F1 5, in 3 rows; F2-F9 4 in 2 rows, (3 apically 1 medially); Fore wing with costal cell 10-13 times as long as broad; speculum sometimes effaced by scattered hairs; Fore wing with speculum, on lower surface of wing, more or less effaced by scattered hairs; basal cell partly, sometimes entirely, pilose. Larger species, up to 3.1 mm.

Diagnostic characters were created from WALKER (1835), GAHAN (1933), GRAHAM (1969) and Figure 289 of BOUCEK & RASPLUS (1991).

H o s t : listed by GRAHAM (1969), NOYES (2017).

D i s t r i b u t i o n : Bulgaria (THUROCY 1990), Czech Republic (KALINA 1989), France (ASHMEAD 1897; GRAHAM 1969), Germany (GRAHAM 1969; VIDAL 2001), Hungary (HERTING 1978), Italy (VIDAL 1997), Moldova (BOUCEK 1961; 1965; DZHANOKMEN, 1978; TSELIKH 2011), Netherlands (GIJSWIJT 2003), Rusia, Sakhalin Oblast (TSELIKH 2011), Spain (GARRIDO & NIEVES ALDREY 1992; GARRIDO TORRES & NIEVES ALDREY 1999), Sweden (HANSSON 1991; GRAHAM 1969; HEDQVIST 2003), United Kingdom (WALKER 1835; THOMSON 1958; BOUCEK & GRAHAM 1978; GRAHAM 1969), England (THOMSON 1958).

***Arthrolytus keltoni* nov.sp. (Figs 1o, 3o)**

T y p e m a t e r i a l s : Holotype ♀, USA: North Carolina, Highland, 27.viii. 1957, Leg. L. A. Kelton, deposited in the CNC.

E t y m o l o g y : The name is derived from the name of Dr. P.C. Kelton who collected the holotype.

D i a g n o s i s : ♀: Malar space 0.36x length of an eye; Antenna with combined length of pedicel plus flagellum 2.52x as long as scape; anelli plus F1 1.63x as long as pedicellus; F1 2.25x as long as width; F2-F4 distinctly longer than width; F5-F6 quadrate, club 1.3x as long as F1. Forewing with costal cell of fore wing 8.4 times as long as broad; submarginal vein 1.32x as long as marginal vein; and marginal vein 1.2x stigmal vein; post marginal vein 1.12x as long as marginal vein 1.46x as long as stigmal vein. Propodeum with lateral carina complete, transverse costula present midway between base and apex of propodeum; surface of propodeum anterior to this costula sculptured, surface

posterior to costula with some carinae; strong median carina present. Body black, metasoma without black spot, 0.33 longer than mesosoma.

Description: The diagnostic characters of this species are given above and need not be repeated here. Some additional characters are the following:

♀: Length 3.5 mm. Body black, Metasoma without black spot; Body black, antennal scape pale, flagellum brown; pedicel and legs beyond coxae yellow, F1 and club testaceous; Fore wing shaded behind marginal vein; forewing with black spot. Fore wing shaded behind marginal vein.

Head in dorsal view 2.1 times as broad as long; with clypeal margin slightly forwarded, minute, closely set slightly irregular rugae converging on anterior mouth opening; Right mandible with 4 teeth, left mandible with 3 teeth; POL 1.5x OOL; Antenna inserted low, slightly above level of ventral edge of eyes; Antenna (Fig. 1o) with combined length of pedicel plus flagellum (116) as long as 1.12x width of head; Relative measurement of antenna: scape 46:7; pedicel 13:6; second anellus twice as long as first anellus; F1 18:8; F2 13:9; F3-F4 12:10; F5-F6 10:10; club 21:12. Linear sensillae on F1 1+3 in 2 rows; F2-F3 2+3 in 2 rows; F4 3+4 in 2 rows; F5-F6 4+5 in 2 rows, C1-C2 5+6 in 2 rows, C3 5 in a row.

Mesosoma 1.4x as long as width; 0.82x as wide as head; scutellum 1.15x as long as width; 1.87x as long as propodeum. Forewing (Fig. 3o) with Relative measurements of m: pm: st= 60: 67: 46.

Metasoma slightly wider than mesosoma; gastral terga 1-2 completely bare dorsally, 3-5th terga with a few setae near lateral margins, 6th and 7th with moderately dense, dorsal bristles.

♂: Unknown.

Comparative notes: *Arthrolytus keltoni* nov.sp. is similar to *Arthrolytus maculipennis* (WALKER 1835) in having antenna inserted low, slightly above level of ventral edge of eyes; malar space hardly one third length of an eye; forewing with black spot; F1 2.2x as long as width. But it differs from *A. maculipennis* in having forewing with costal cell of fore wing 8.4 times as long as broad; antenna with anelli plus F1 1.63x as long as pedicellus; F2-F4 distinctly longer than width; F5-F6 quadrate, club 1.3x as long as F1 (in *A. maculipennis* forewing with costal cell of fore wing 10.5-11 times as long as broad; sometimes relatively longer; antenna with anelli plus F1 2.4x as long as pedicellus; F2 slightly longer than width; F3 quadrate; F4 slightly, F5-F6 distinctly transverse. club 0.88x as long as F1).

Distribution: USA: North Carolina, highland.

***Arthrolytus incisus* ASKEW & NIEVES ALDREY, 1982 (Figs 2i, 3q)**

Type materials: Holotype ♂. Spain, Salamaca, Dehasa de Candelario, UTM. -30TTK6670, 7-14.xi. 1979. Leg. J. L.Nieves. Deposited in in coll. (BMNH).

Diagnosis: Anterior margin of clypeus incised. Antennal formula 11263; antenna (Fig. 2i) with combined length of pedicel and flagellum 1.29 x breadth of head; scape linear without anterior expansion, extending slightly above vertex; pedicel in profile about 2x as long as broad, 0.83x as long as F1; anelli subequal; flagellum filiform, F1 narrower than pedicel, F1-F3 3x as long as broad, F6 about 2x as long as broad, club 3.84x as long as broad, very slightly broader than funicle segments. Linear sensillae on flagellar segment as: F1-F6 and C1 one sensillae, C2-C3 without sensillae; Forewing

(Fig. 3q) hyaline with a weak, brown infuscation posterior to parastigma; with costal cell 11x as long as width. Propodeal plicae absent. Metasoma with venter and first three tergites yellow.

Description: given by ASKEW & NIEVES ALDREY (1982).

Host: reared from the gall of *Andricus quercusradicis* (FABRICIUS) on *Quercus pyrenaica*, GALL collected 19.x.1979, parasite emerged 7-14.xi. 1979 (ASKEW & NIEVES ALDREY 1982).

Distribution: Spain: Salamaca, Dehasa de Candelario, UTM. -30TTK6670.

***Arthrolytus nenehatunae* nov.sp. (Figs 2j, 3r)**

Type materials: Holotype ♂, Turkey: Erzurum, 04.vi. 1982. Leg. M. Doğanlar, deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC). Paratypes: 2♂♂, same data as the holotype.

Etymology: The name is derived from the name of Miss. Nene Hatun who is a famous legendary hero lady from Erzurum during the Ottoman-Russian War in 1877-1878.

Diagnosis: ♂: Anterior margin of clypeus entire; antenna with combined length of pedicel and flagellum almost 1.5x as long as breadth of the head; pedicel 1.5x as long as wide and 0.5x as long as F1; flagellum 4.68x length of scape, filiform; funicular segments as wide as pedicel, almost in same width; F1 2.6x as long as broad; F2 2.14x as long as width; F6 1.67x as long as wide; club 3.66x as long as broad, about as long as 2 preceding funicular segments; forewing with a cloud, slightly darker below stigmal vein; post marginal vein 1.14x marginal vein and 1.41x stigmal veins; marginal vein 1.23x stigmal vein, 0.88x postmarginal vein. Propodeum with median area 1.66x as wide as long, with broad fovea basally; without transverse costula, plicae and median carina; antenna with pedicel yellow. Metasoma with a yellow band on second and third tergite.

Description: The diagnostic characters of this species are given above and need not be repeated here. Some additional characters are the following:

♂: Body 2.5 mm long. body black with bluish metallic reflection, legs with coxae concolorous with body; femora, tibiae and tarsi yellow, except pretarsi brown; antenna with scape, pedicel and anelli yellow, flagellum black.

Head in lateral view (36:22) 1.64x as height as length; in anterior view (47:36) 1.3x as wide as height; in dorsal view (47: 22) 1.24x wider than mesoscutum (38); wide of frons 28; length of eye 24; lower margin of clypeus entire in the middle; POL: OOL 12: 7; eye long oval 24:17, malar space (8) 0.33x eye length; Antennal formula 11263. Antenna (Fig. 2j) with scape (25), basally narrow, slightly expanded in its upper half, the subapical shiny boss tending to be indistinct; combined length of pedicel and flagellum (117), pedicel (9:6) 1.5x as long as width and 0.5x as long as F1; flagellum (104), filiform; F1 (18:7); F2 (15:7); F3 (14); F4 (13); F5 (12); F6 (10:6) 1.67x as long as width; club (22), 3 segmented, acuminate, long 1.22x as long as F1. Linear sensillae on F1 5, in 2 rows, in apical half; F2 5, F3-F6 3, in one row, in apical half; C1 2; C2 1; C3 1.

Scutellum (with axillulae) (17:15) 1.13x as long as width; Forewing (Fig. 3r) with stigmal vein forming 30° angle to the postmarginal vein; stigmal vein thin, long with a broad knob; costal cell 13 times as long as broad; basal cell with some hairs distally, basal vein distinct, speculum open; marginal vein distinctly enlarged, measurements of m: pm: st as 21: 24: 17; Propodeum about 0.4x length of scutellum; median area 0.66x as wide as long (20:12).

Metasoma 0.86x as long as mesosoma, about twice as long as width.

♀: unknown.

B i o l o g y : unknown.

D i a g n o s i s : *Arthrolytus nenehatunae* nov.sp. is similar to *Arthrolytus slovacus* Graham 1969 in having anterior margin of clypeus entire or slightly immargined; Antenna with combined length of pedicel and flagellum almost 1.5x as long as breadth of the head; club 3.66x as long as broad. But it differs from *A. slovacus* in having forewing with a cloud, slightly darker below stigmal vein; post marginal vein 1.14x marginal vein and 1.41x stigmal veins; marginal vein 1.23x stigmal vein, 0.88x postmarginal vein; propodeum with median area 1.66x as wide as long, with broad fovea basally; without transverse costula, plicae and median carina; antenna with pedicel yellow (in *A. slovacus* forewing immaculate; marginal vein about 1.8 times as long as the stigmal vein, and slightly longer than the postmarginal vein; median area of propodeum only about 1.5 times as wide as long, reticulate, with complete plicae; antenna with pedicel brown).

***Arthrolytus nuridemiragi* nov.sp. (Figs 2m, 3s)**

T y p e m a t e r i a l s : Holotype ♂, Turkey: Samsun, 21.vii.1986, deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

E t y m o l o g y : The name is derived from the name of Mr. Nuri Demirağ who built the railway between Ankara and Samsun in 1930's, built the first airplain factory in 1936, and for many more invaluable works in the Young Turkey.

D i a g n o s i s : ♂: Antenna with combined length of pedicel and flagellum almost as long as breadth of the head; club about 2.94 times as long as broad; flagellum 3.2x length of scape, the latter basally narrow, expanded in its upper half, the subapical shiny boss tending to be indistinct; pedicel 1.5x as long as width; F1 1.37x as long as pedicel; F1 only slightly constricted basally, twice as long as broad; F2 1.37x, F3-F4 1.11x as long as width; Linear sensillae on F1-F2 1; F3 3; F4 2; F5 2; F6 2; C1 and C2 3; C3 2. Head in lateral view 1.82x as height as long; eye long oval 1.5x as long as width; POL 1.9x OOL; Forewing with stigmal vein forming 40° angle to the postmarginal vein; the latter 0.87x marginal vein and 1.33x stigmal veins; marginal vein 1.53x stigmal vein; basal cell bare, basal vein hairy; speculum narrowly open. Propodeum with median area about 0.47x length of scutellum; costula slightly indicated, median carina absent, plicae in basal half distinctly developed. Legs brown with metallic reflexion except tips of femora, tibiae and tarsi testaceous. Metasoma 2.6x as long as width; almost as long as mesosoma; basally without pale spot

D e s c r i p t i o n : The diagnostic characters of this species are given above and need not be repeated here. Some additional characters are the following:

♂: Body 2.57 mm long. Body black, with metallic bluish reflection; antenna with scape, pedicel and anelli yellow, funicular segments and club black; forewing hyaline.

Head in lateral view 40:22; in anterior view 51:40 1.27x as wide as height; in dorsal view 51: 22, almost as wide as mesoscutum (48); wide of frons 35; lower margin of clypeus entire in the middle; eye long oval (24:16) 1.5x as long as width; malar space (10) 0.42x eye length; Antenna (Fig. 2m) with scape 32, combined length of pedicel and flagellum (34); pedicel (11:7) about 1.6 times as long as width; flagellum 102, filiform; funicular segments distinctly broader than pedicel, almost in same width, F1 15:8, F2 11:8; F3-F4 10:9; F5 9:9; F6 9.5:9, slightly longer than broad; club 25, 3 segmented, acuminate, long

1.67x as long as F1; about 0.78x of 3 preceding funicular segments. Linear sensillae on F1-F2 1; F3 3; F4 2; F5 2; F6 2; C1 3; C2 3; C3 2.

Mesosoma 1.72x as long as width; slightly narrower than width of head; scutellum almost as long as width (with axillulae) 23:24; Forewing with stigmal vein forming 40° angle to the postmarginal vein; stigmal vein thin, long with a broad knob; costal cell 8.8 times as long as broad; Forewing (Fig. 3s) with post marginal vein slightly shorter than marginal (20:23) and 1.33x stigmal veins; basal cell bare, basal vein hairy speculum narrowly open; marginal vein slightly enlarged, measurements of m:pm:st as 23: 20: 15.

Metasoma 2.1x as long as width, almost as long as mesosoma.

♀: unknown.

Comparative notes: The new species similar to ♂ of *Arthrolytus yazicioglu* nov.sp. in having antennal formula 11263 and club at most 2.94 times as long as broad, but it differs from *A. yazicioglu* nov.sp. in having antenna with combined length of pedicellus and flagellum as long as the breadth of the head; flagellum 3.2x length of scape, F2 1.37x, F3-F4 1.11x as long as width; club about 2.94 times as long as broad; POL 1.9x OOL (in *A. yazicioglu* nov.sp. antenna with combined length of pedicellus and flagellum 1.26 times the breadth of the head; flagellum 4.25x length of scape; F2 1.63x; F3-F4 1.43x as long as width; club about 2.67 times as long as broad; femora testaceous, tibiae and tarsi yellow; POL 1.43x OOL), and some more characters given in the key.

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Zusammenfassung

In vorliegender Studie wurden verschiedene Arten des weltweit verbreiteten Genus *Arthrolytus* THOMSON, 1878 (Hymenoptera: Pteromalidae, Pteromalinae) untersucht. Es gelang der Nachweis von 21 Arten, 9 von ihnen als neue Arten. Die Untergattungszuordnung erfolgt wie nachstehend: *A. oezbeki* DOĞANLAR, 1978, *A. oswaldpecki* nov.sp. in *Anadolytus* DOĞANLAR, 1978; *A. ocellus* (WALKER, 1834), *A. glandium* BOUCEK, 1967, *A. nanus* ASKEW & NIEVES ALDREY, 1982, *A. magarsosensis* nov.sp. in *Anarthrolytus* GRAHAM, 1969; und *A. muesebecki* BURKS, 1969, *A. megaspilus* (WALKER, 1874), *A. discoideus* (NEES, 1834), *A. fasciatus* (PROVANCHER, 1881), *A. usubai* KAMIJO, 1981, *A. yazicioglu* nov.sp., *A. gurderei* nov.sp., *A. slovacus* GRAHAM, 1969, *A. kahvecii* nov.sp., *A. maculipennis* (WALKER, 1835), *A. keltoni* nov.sp., *A. geyrazensis* nov.sp., *A. incisus* ASKEW & NIEVES ALDREY, 1982, *A. nenehatunae* nov.sp., *A. nuridemiragi* nov.sp. in *Arthrolytus* s.str. Die neuen Arten wurden detailliert beschrieben, ein Bestimmungsschlüssel für alle bekannten Arten der Erde wurde erstellt.

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