

A Key to Genera of Iranian Lady Beetles (Coleoptera: Coccinellidae) and Species of Subfamilies Chilocorinae, Coccinellinae, Epilachinae and Microweiseinae

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A key to genera of Iranian Coccinellidae, besides species of subfamilies Chilocorinae, Coccinellinae, Epilachinae and Microweiseinae is given.

Keywords: Lady beetle, key, Iran.

Lady beetles or ladybirds, as the largest family in the newly recognized superfamily Coccinelloidea (Robertson et al. 2015) with about 6000 species described worldwide (Iablokoff-Khanzorian 1982; Vandenberg 2002), are well known as mostly beneficial predators of aphids, scale insects and mites. Also, some species of ladybirds are so sensitive to changes in the environment that could be considered as evaluation factors of the health of ecosystems (Iperti 1999), which increases their importance in the nature. Nevertheless, some of them are mycophagous and phytophagous which could be sometimes considered as a pest (Dobzhansky 1933).

According to the last checklist of the family in Iran (Abdolahi et al. 2016) there are 142 species classified in 8 subfamilies, 17 tribes and 41 genera in the country which demonstrates a high diversity of genera and species in Iran. So, according to high amount of lady beetle species in Iran, it seems necessary to providing a comprehensive key to identifying of the genera and species.

Although there are many literatures related to fauna of Iranian Coccinellidae, mostly they were faunistic reports without any appropriate key, even to the Iran subfamilies. Many of Iranian lady beetle species are really rare and have been described since many years ago. For many species, particularly rare species, literatures are too old and not available in internet. Also, for many species descriptions are not in English. Maybe that is why there was not any key to Iranian lady beetles so far, even to subfamilies and

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tribes. For this purpose this paper is an attempt to provide a key to genera of Iranian lady beetles, besides species of the subfamilies Chilocorinae, Epilachinae, Microweiseinae and Coccinellinae.

Materials and Methods

According to the last classification of Coleoptera, Coccinellidae has been classified in two subfamilies Microweiseinae and Coccinellinae (Bouchard et al. 2011) but we used the classification of (Kovář 2007) modified by (Nedvěd and Kovář 2012) in this paper.

This list incorporated the most recent systematic and nomenclature updates. The arrangement of the subfamilies, tribes and genera do not reflect phylogenetic relationships.

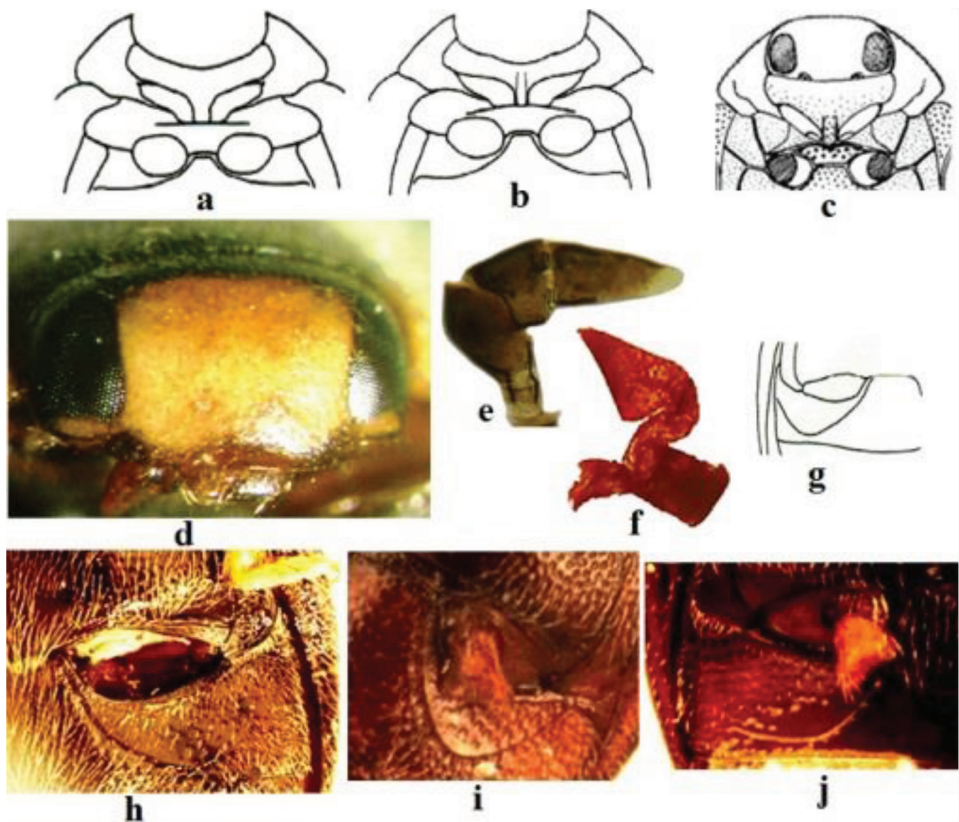


Fig. 1. a–c: Prosternum and mesosternum; a: genus *Adalia*, b: genus *Coccinula*; c: genus *Cryptolemus*; d: clypeus in genus *Platynaspis*; e–f: maxillary palp; e: genus *Pharoscymnus*, f: genus *Adalia*; g–j: postcoxal line; g: genus *Scymniscus*, h and i: genus *Scymnus*, j: genus *Nephus*

Results

Key to genera and species of Iranian lady beetles of subfamilies Chilocorinae, Coccinellinae, Epilachninae and Microweiseinae

1. Mandibles with four or more large separated teeth..... Epilachninae, Epilachini 8
 - Mandibles with one or two apical teeth 2
2. (1) – Clypeus anteriorly extending and covering anterior margin of eye and the basal part of antenna in front view (Fig. 1d) 3
 - Clypeus does not extend and not cover basal part of antenna 4
3. (2) – Body rounded; lateral margins of elytra explanate; mandibles with a single apex; body glabrous or sparsely hairy Chilocorinae, Chilochorini 10
 - Body oval; elytra on sides simple; mandibles with two apical teeth; body covered in dense hairs..... Scymninae, Platynaspidini, *Platynaspis luteorubra* (Goeze, 1777)
4. (2) – Distal segment of maxillary palp elongate and oval (Fig. 1e)..... Sticholotidinae and Microweiseinae 22
 - Distal segment of maxillary palp with different shape, mostly ax-shaped (Fig. 1f) 5
5. (4) – Antenna usually longer than 2/3 head width 6
 - Antenna as long as 2/3 head width or shorter Scymninae 25
6. (5) – Elytra and pronotum smooth Coccinellinae 31
 - Elytra and pronotum pubescent 7
7. (6) – Antenna longer than 2/3 head width and shorter than whole head width; eyes big and finely faceted.....
 - Ortaliinae* Mulsant, 1850; *Noviini* Mulsant, 1850; *Rodolia* Mulsant, 1850
 - Antenna longer than head width; eyes coarsely faceted Coccidulinae 60
8. (1) – Body size 3–5 mm, lateral margins of pronotum straight 9
 - Body size 6–9 mm, lateral margins of pronotum non-straight 10
9. (8) – Scutellum black, pronotum usually with a black spot
 - Subcoccinella vigintiquatuorpunctata* (Linnaeus, 1758)
 - Scutellum light, pronotum without spot ... *Cynegetis syriaca* Chevrolat, 1836
10. (8) – Each elytron with 6 black spots, one spot joined to scutellum and elytral suture..... *Henosepilachna argus* (Geoffroy, 1785)
 - Each elytron with 6 black spots without joining to scutellum and elytral suture..... *Chnootriba elaterii* P. Rossi, 1794
10. (3) – Body strongly rounded and convex; frontal plate emarginated at anterior margin; femoral line forming quarter of a circle
 - Chilocorus bipustulatus* (Linnaeus, 1758)
 - Body oval to round; frontal plate not emarginated; femoral line forming half a circle 11
11. (10) – Antenna 8-segmented *Brumoides adenensis* E. A. Chapin, 1965
 - Antenna 10-segmented 12
12. (11) – Scutellum more than 20 times narrower than body; legs black-brown, elytra usually with spots *Exochomus* Redtenbacher, 1844 13

- Scutellum 16 times narrower than body; legs yellowish-red; elytra always black without any spots *Parexochomus* Barovskij, 1922 19
13. (12) – Elytra with two oblique blackish strips
 *Exochomus bifasciatus* (Barovskij, 1927)
 – Elytra with different patterns 14
14. (13) – Elytra spots long and strip-shaped, rarely without spot 15
 – Elytra spots small, almost circular-shape..... 16
15. (14) – Elytra with or without spots, background of elytra blackish, spots and strips brownish, in case of absence of spots elytra completely brownish, Basal lobe shorter than paramere
 *Exochomus quadripustulatus* (Linnaeus, 1758)
 – Elytra with spots and stripes, background of elytra brownish, spots and stripes blackish, basal lobe as long as paramere or a little longer
 *Exochomus undulatus* (Weise, 1878)
16. (14) – Elytra blackish, each elytron with two spots
 *Exochomus quadriguttatus* (A. Fleischer, 1900)
 – Elytra brownish, each elytron with more than two spots 17
17. (16) – Most parts of pronotum brownish, with a black spot in middle
 *Exochomus octosignatus* (Gebler, 1830)
 – Most parts of pronotum blackish 18
18. (17) – Middle spot of elytra elongate, basal lobe shorter than paramere.....
 *Exochomus gebleri* (Weise, 1885)
 – Middle spot of elytra not elongate, basal lobe as long as paramere or a little longer *Exochomus kiritschenkoi* (Barovskij, 1927)
19. (12) – Body smooth and without hair 20
 – Body hairy 21
20. (19) – Pronotum completely yellowish
 *Parexochomus nigripennis* (Erichson, 1843)
 – Only lateral margins of pronotum yellowish
 *Parexochomus nigromaculatus* (Goeze, 1777)
21. (19) – Body with dense hairs, basal lobe apically subulate, elytra margins further brownish..... *Parexochomus pubescens* (Kuster, 1848)
 – Body usually with spare hairs, basal lobe apically finger-shaped, elytra margins further blackish..... *Parexochomus melanocephalus* (Zoubkoff, 1833)
22. (4) – Body smooth or with spare hairs, prosternum covering mouth part
 Serangiini, *Serangium montazerii* Fursch, 1995
 – Body pubescent, prosternum not covering mouth part 23
23. (22) – Prosternum extended.....
 Microweiseini, *Paracoelopterus berytensis* J. Weise, 1884
 – Prosternum not extended 24
24. (23) – Elytra without spots
 Sticholotidini, *Coelopterus salinus* Mulsant and Rey, 1852
 – Elytra with spots Sticholotidini, *Pharoscyrnus* Bedel, 1906

25. (5) – Pronotum and elytra smooth Hyperaspidini, *Hyperaspis* Chevrolat, 1837
 – Pronotum and elytra pubescent 26
26. (25) – Anterior margin of prosternum lobed, at least partially concealing mouthparts; all hairs on elytra directed posteriorly; body size 1–1.5 mm (Fig. 1c) Stethorini, *Stethorus* Mulsant, 1850
 – Anterior margin of prosternum not lobed 27
27. (26) – Postcoxal line joining hind margin of the first abdominal ventrite, apex not recurved Diomini, *Diomus rubidus* Motschulsky, 1837
 – Postcoxal line complete or incomplete, not joining hind margin of first abdominal sternum, apex recurved Scymnini 28
28. (27) – Hairs in the hind third of elytra directed obliquely from the elytral suture 29
 – Hairs in the hind part of elytra directed parallel to elytral suture *Clitostethus arcuatus* (Rossi, 1794)
29. (28) – Prosternal process wide and smooth, without carinae; distal part of postcoxal line parallel with abdominal segment margin and only slightly recurved (Fig. 1j) *Nephus* Mulsant, 1846
 – Prosternal process narrow, with carinae; distal part of postcoxal line not parallel with abdomen segment margin, clearly recurved 30
30. (29) – Postcoxal line reaching lateral margin of abdominal segment (Fig. 1g)..... *Scymniscus* Dobzhansky, 1925
 – Postcoxal line reaching anterior margin of abdominal segment (Fig. 1i) or incomplete (Fig. 1h) *Scymnus* Kugelann, 1794
31. (6) – Antenna 1.5 to two times longer than head width; mandibles with a row of small teeth below apex Halysiini 32
 – Antenna shorter than 1.5 times as head width; mandibles without row of small teeth Tytthaspidini and Coccinellini 34
32. (31) – Elytral spots black *Psyllobora* Dejean, 1836 47
 – Elytral spots white 33
33. (32) – Eight spots on each elytron; body flat *Halyzia sedecimguttata* (Linnaeus, 1758)
 – Six spots on each elytron; body convex..... *Vibidia duodecimguttata* (Poda in Neuhaus, 1761)
34. (33) – Elytra spots quite quadrate *Propylea quatuordecimpunctata* (Linnaeus, 1758)
 – Elytra spots rounded or irregular 35
35. (34) – Pronotum black with light spots in the anterior corners 36
 – Pronotum with different patterns 37
36. (35) – Femoral line bifurcate; antenna as long as frons width *Coccinella* Linnaeus, 1758 48
 – Femoral line not bifurcate, antenna longer than frons width *Ceratomegilla undecimnotata* D. H. Schneider, 1792

37. (35) – Distal parts of femora distinctly visible beyond body in dorsal view
 *Hippodamia* Chevrolat, 1836
 – Distal parts of femora barely visible beyond body in dorsal view 38
38. (37) – Body distinctly flat
 *Aphidecta obliterate* (Linnaeus, 1758)
 – Body convex or relatively flat 39
39. (38) – Pronotum with anchor-shaped spot
 *Menochilus sexmaculatus* (Fabricius, 1781)
 – Pronotum without anchor-shaped spot 40
40. (39) – Each elytron with 4 spots near to elytral suture, one spot in anterior lateral margin and one zigzag-shaped strip in margin
 *Tythaspis sedecimpunctata* (Linnaeus, 1758)
 – Elytra with different patterns 41
41. (40) – Body relatively elongate and flat
Anisosticta Dejean, 1837 (in Iran including three species: *A. caucasica* Fleischer, 1900; *A. bitriangularis* (Say, 1842) and *A. novemdecimpunctata* (Linnaeus, 1758))
 – Body oval 42
42. (41) – Antenna longer than head width; elytra usually with light spots
 *Calvia* Mulsant, 1850 53
 – Antenna shorter than head width; elytra spots are not white 43
43. (42) – Claw with tooth at base 44
 – Claw simple, without tooth, body strongly convex with dense punctuation, mandibles with fine serration below two apical tips
 *Bulaea lichatschovii* Hummel, 1827
44. (43) – Prosternum flat, mesosternum with excision for prosternal process.... 45
 – Prosternum convex without carinae (Fig. 1a); mesosternum straight anteriorly (Fig. 1a) *Adalia* Mulsant, 1846 54
45. (44) – Prosternum with carinae (Fig. 1b), anterior margin of mesosternum straight, emarginated (Fig. 1b), spurs on mid and hind tibia long
 *Coccinula* Dobzhansky, 1925 56
 – Anterior margin of mesosternum more or less excised, spurs on mid and hind tibia short or missing 46
46. (45) – Tibia with short spurs; body size 3–5.4 mm
 *Oenopia* Mulsant, 1850 58
 – Tibia without spurs; body size 5–8 mm
 *Harmonia quadripunctata* (Pontoppidan, 1763)
47. (32) – Each elytron with 10 spots, pronotum with spot
 *Psyllobora vigintiduopunctata* (Linnaeus, 1758)
 – Each elytron with 8 spots, pronotum without spot.....
 *Psyllobora bisoctonotata* (Mulsant, 1850)
48. (36) – Elytra with L-shaped spot *Coccinella iranica* Dobzhansky, 1926
 – Elytra without L-shaped spot 49

49. (48) – Body length 5.3–7.6 mm, elytra with at most seven spots
 *Coccinella septempunctata* Linnaeus, 1758
 – Body length 5 mm, elytra with 11 spots 50
50. (49) – Basal lobe with a warhead-shaped structure in distal part, elytra spots
 large, rare..... *Coccinella magnopunctata* Rybakow, 1889
 – Basal lobe without a warhead-shaped structure in distal part
 *Coccinella undecimpunctata* Linnaeus, 1758
51. (37) – Pronotum with three spots, one large spot in the middle and two small
 spots in the margins
 *Hippodamia tredecimpunctata* (Linnaeus, 1758)
 – Pronotum with a large black spot 52
52. (51) – Pronotum spot crown-shaped with a depression in the middle and some-
 times in the lateral margins, siphon with a warhead-shaped structure in the
 sub-apical part *Hippodamia variegata* (Goeze, 1777)
 – Pronotum spot large, without depression and covering most of pronotum
 *Hippodamia septemmaculata* (DeGeer, 1775)
53. (42) – Elytra without spot or at most with 6 spots
 *Calvia punctata* (Mulsant, 1853)
 – Elytra with 14 spots *Calvia quatuordecimguttata* (Linnaeus, 1758)
54. (44) – Basal lobe from lateral view sword-shaped with a depression in the upper
 middle part *Adalia tetraspilota* (Hope, 1831)
 – Basal lobe not sword-shaped from lateral view 55
55. (54) – Scutellum, usually mesoepimeron and sometimes mesonotum light or
 brownish *Adalia decempunctata* (Linnaeus, 1758)
 – Scutellum, mesonotum and mesoepimeron black
 *Adalia bipunctata* (Linnaeus, 1758)
56. (45) – Polymorphic in elytra pattern, basal lobe shorter than paramere
 *Coccinula elegantula* (Weise, 1890)
 – Polymorphic in elytra pattern, basal lobe almost as long as paramere..... 57
57. (56) – Pronotum spot large, black and covering most parts of pronotum
 *Coccinula sinuatmarginata* Faldermann, 1837
 – Pronotum with different pattern *Coccinula redimita* (Weise, 1885)
58. (46) – Elytra with a I-shaped spot *Oenopia montana* Savoyskaya, 1969
 – Elytra spots with different shapes 59
59. (58) – Middle spot of elytra extending toward elytral suture
 *Oenopia conglobate* (Linnaeus, 1758)
 – Polymorphic in elytra pattern *Oenopia oncina* (Olivier, 1808)
60. (7) – Antenna ten-segmented; tarsus visibly 4-segmented
 Tetrabrachini, *Tetrabrachys* Kapur, 1948
 – Antenna eleven-segmented; tarsus virtually with three segments
 Coccidulini 61
61. (60) – Anterior margin of prosternum lobed-shaped, at least partially concealing
 mouthparts (Fig. 1c) *Cryptolaemus montrouzieri* Mulsant, 1853
 – Anterior margin of prosternum not concealing mouthparts 62

62. (61) – Body $1.6 \times$ longer than wide; pronotum widest at hind margin
 *Lindorus lophantae* Blaisdell, 1892
 – Body twice longer than wide; pronotum widest in middle or at anterior half
 *Coccidula* Kugelann, 1798

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