



An annotated checklist of the aquatic Polyphaga (Coleoptera) of Egypt I. Family Hydraenidae

MOHAMED SALAH¹, JUAN ANTONIO RÉGIL CUETO² & LUIS F. VALLADARES^{2,3}

¹Zoology & Entomology Department, Faculty of Science, Helwan University, 11795–Helwan, Cairo, Egypt

²Department of Biodiversity & Environmental Management (Zoology), León University, 24071–León, Spain

³Corresponding author. E-mail: lfvald@unileon.es

Abstract

Data from previous literature were used to compile a checklist of the Egyptian fauna of Hydraenidae (Coleoptera). The checklist includes data on the type localities, type specimens, descriptors, distributions and previous literature for 15 valid species belonging to 3 genera (*Hydraena*, *Limnebius* and *Ochthebius*). *Ochthebius* was represented by 13 species, while *Hydraena* and *Limnebius* were represented only by a single species for each of them. The present study provides a summary that can serve as the basis for future progress in the knowledge of the Egyptian Hydraenidae.

Key words: Hydraenidae, aquatic Coleoptera, checklist, distribution, Egypt

Introduction

Aquatic Coleoptera constitute a significant part of the macrozoobenthos of freshwater habitats. Approximately 25 families in three of four suborders of Coleoptera are typically aquatic in some of their life stages (Balke 2005). Among these are the minute moss beetles of the family Hydraenidae. These are small beetles, between ca. 1–3 mm long (Jäch 1995). While adults of most hydraenid species live in a wide variety of aquatic habitats including stagnant waters, running waters and seepages, many are riparian or strictly terrestrial and a few species are known to live exclusively in hypersaline marine rock pools and inland salt lakes (Jäch 1998a). Hydraenid larvae are usually riparian or terrestrial and are likely to be marginal, only the first instar of some species is aquatic (Gooderham & Tsyrlin 2002; Jäch & Balke 2008). Hydraenidae is a cosmopolitan family and contains about 1,600 species grouped in 42 genera (Ślipiński *et al.* 2011). This family probably contains the largest number of undescribed species, and it is the only one in which more than 1,000 species are expected to be still undescribed (Jäch & Balke 2008). Approximately 800 species and subspecies of Hydraenidae are described from the Palaearctic Region (Jäch 2004).

The study of African beetles has received considerable attention from several European taxonomists, and there is a long history of research on the water beetles of Egypt. However, descriptions, taxonomic notes and distribution of most Egyptian species are found scattered in the old literature which are often available only with considerable difficulty.

Complementing the recent studies of Salah & Régil (2014a,b), the present work aims to compile an annotated list of the Egyptian Hydraenidae, integrating all published sources and bringing together all the scattered literature on the family, thereby providing a summary that can serve as the basis for future progress in the knowledge of the group.

Material and methods

1. Biogeography of Egypt

Egypt occupies the North-eastern corner of the African continent, with a surface area of just over one million

Ochthebius (Asiobates) rugulosus Wollaston 1857

The species was recorded in Egypt (Cairo and Ismailia) by Jäch (1990). According to Jäch (1998b) and Hansen (1998) it is a misidentified species. The species is distributed (Jäch 1998b; Hansen 1998) in the Madeira Islands (Madeira and Porto Santo) and the Canary Islands (Tenerife, La Gomera, Gran Canaria, Fuerteventura, La Palma).

Conclusions

In conclusion, even though more than 40 genera and about 1600 species are known worldwide, the family Hydraenidae is poorly represented in Egypt. Only 3 genera (*Hydraena*, *Limnebius* and *Ochthebius*) are found on the Egyptian territory. In Egypt, a large Country with distinctly different geographical regions and different ambiances, the number of Hydraenidae species must be expected to be much higher than has been recorded so far. New intensive studies of these insects are suggested.

Acknowledgments

We are grateful to the Egyptian Ministry of Higher Education and to the staff of the Department of Biodiversity and Environmental Management, León University, Spain, for supporting us in all aspects during the completion of this work.

References

- Alfieri, A. (1916) Coléoptères et Hémiptères de la faune aquatique d'un étang d'Abou-Zaabal et observations diverses sur certaines espèces. *Bulletin de la Société Entomologique d'Égypte*, 4, 93–95.
- Alfieri, A. (1957) Additions a la faune coléoptérologique de l'Égypte et du Sinai. *Bulletin de la Société Entomologique d'Égypte*, 41, 123–127.
- Alfieri, A. (1976) Coleoptera of Egypt. *Mémoires de la Société entomologique d'Égypte*, 5, i–xiii+1–361.
- Andres, A. (1913a) Note Bibliographique; Coleoptera mediterranea orientalia, quae in Aegypto, Palaestina, Syria, Caramania atque in Anatolia occidentali anno 1904 collegerunt John Sahlberg et Unio Saalas. *Bulletin de la Société Entomologique d'Égypte*, 3, 84–132.
- Andres, A. (1913b) Sur une Liste de Coléoptères capturés en 1867 à 1869 par le Dr. O. Schneider á Ramleh près d'Alexandrie. *Bulletin de la Société Entomologique d'Égypte*, 3, 39–48.
- Baha El Din, S.M. (2001) Egypt. In: Fishpool, L.D.C. & Evans, M.I. (Eds.), *Important bird areas in Africa and associated islands: Priority sites for conservation*, Pisces Publications and Birdlife International, Newbury and Cambridge, UK, pp. 241–264.
- Balfour-Browne, J. (1951) Coleoptera: Haliplidae, Dytiscidae, Gyrinidae, Hydraenidae, Hydrophilidae. In: *Expedition to South-west Arabia 1937–1938*. British Museum of Natural History, London, pp. 179–220, pls. 10–11.
- Balke, M. (2005) Dytiscidae Leach, 1915. In: Kristensen, N.P. & Beutel, R.G. (Eds.), *Handbook of Zoology. Vol. IV. Arthropoda: Insecta. Part 38. Coleoptera. Vol. 1. Morphology and Systematics (Archostemata, Adephaga, Myxophaga, Polyphaga partim)*. Walter De Gruyter, Berlin, New York, pp. 90–116.
- Berthélemy, C., Kaddouri, A. & Richoux, Ph. (1992) Revision of the genus *Hydraena* Kugelann, 1794 from North Africa (Coleoptera: Hydraenidae). *Elytron*, 5 (1991), 181–213.
- Boukal, D.S., Boukal, M., Fikacek, M., Hajek, J., Klecka, J., Skalicky, S., Stastny, J. & Trávnicek, D. (2008) Katalog vodních brouků ěeské republiky. Catalogue of water beetles of the Czech Republic (Coleoptera: Sphaeriusidae, Gyrinidae, Haliplidae, Noteridae, Hygrobiidae, Dytiscidae, Helophoridae, Georissidae, Hydrochidae, Spercheidae, Hydrophilidae, Hydraenidae, Scirtidae, Elmidae, Dryopidae, Limnichidae, Heteroceridae, Psephenidae). *Klapalekiana*, 43 (2007) (Supplementum), 1–289.
- Chiesa, A. (1959) *Hydrophilidae Europae, Coleoptera Palpicornia. Tabelle di determinazione*. Arnaldo Forni, Bologna, 199 pp.
- Delgado, J.A. & Jäch, M.A. (2007) Revision of the Palearctic species of the genus *Ochthebius* Leach XXIII. The *O. (Asiobates) maculatus* species complex (Coleoptera: Hydraenidae). *Koleopterologische Rundschau*, 77, 101–121.
- Emery, C. (1886) Über Phylogenie und Systematik der Insekten. *Biologisches Centralblatt*, 5 (21), 648–656.
- Ertoran, N. & Tanatmış, M. (2010) Hydraenidae species diversity of South Marmara Region in Turkey (Coleoptera). *Munis Entomology and Zoology*, 5 (2), 608–622.
- Fabricius, J.C. (1792) *Entomologia systematica emendata et aucta. Secundum classes, ordines, genera, species adjectis*

- synonymis, locis, observationibus, descriptionibus. I (1)*. C.G. Proft, Hafniae, xx + 330 pp.
<http://dx.doi.org/10.5962/bhl.title.36532>
- Fairmaire, L. (1879) Coléoptères du Nord de l'Afrique. *Revue et Magasin de Zoologie Pure et Appliquée*, Series 3, 7 (42), 178–218.
- Gemminger, M. & Harold, E. von. (1868) *Catalogus Coleopterorum hucusque descriptorum synonymicus et systematicus*, Monachii, 2, 425–752. [Gummi, E.H. (Ed.)]
<http://dx.doi.org/10.5962/bhl.title.9089>
- Gooderham, J. & Tsyrlin, E. (2002) *The Waterbug Book: A Guide to the Freshwater Macroinvertebrates of Temperate Australia*. CSIRO Publishing, Australia, 232 pp.
- Guillebeau, F. (1896) Description de quelques espèces de Coléoptères inédites. *Bulletin de la Société Entomologique de France*, 226–232; 239–245.
- Hanna, H.M. (1969) Studies on catches of Coleoptera in a light trap, at Assiut. *Bulletin de la Societe Entomologique d' Egypte*, 53, 591–613.
- Hansen, M. (1998) *World catalogue of insects. Vol. 1. Hydraenidae (Coleoptera)*. Apollo Books, Vester-Skerninge, Denmark, 168 pp.
- Hoath, R. (2003) *A field guide to the mammals of Egypt*. The American University in Cairo Press, Egypt, 234 pp.
- Ienișteea, M.A. (1988) Vorläufige Beiträge zur Revision einiger Ochthebiidae (Coleoptera). *Lucrările celei de a IV-a Conferințe Naționale de Entomologie, Cluj-Napoca, 29-31 mai, 1986*, 217–238.
- Jäch, M.A. (1984) New and little known Palearctic species of the genus *Ochthebius* (Subgen. *Hymenodes*) (Coleoptera: Hydraenidae). *Aquatic Insects*, 6 (2), 109–114.
<http://dx.doi.org/10.1080/01650428409361172>
- Jäch, M.A. (1989) Revision of the Palearctic species of the genus *Ochthebius* Leach I. The so-called subgenus “*Bothochius*” (Hydraenidae: Coleoptera). *Koleopterologische Rundschau*, 59, 95–126.
- Jäch, M.A. (1990) Revision of the Palearctic species of the genus *Ochthebius* Leach V. The subgenus *Asiobates* (Coleoptera: Hydraenidae). *Koleopterologische Rundschau*, 60, 37–105.
- Jäch, M.A. (1991) Revision of the Palearctic species of the genus *Ochthebius* VII. The *foveolatus* group (Coleoptera: Hydraenidae). *Koleopterologische Rundschau*, 61, 61–94.
- Jäch, M.A. (1992a) Revision of the Palearctic species of the genus *Ochthebius* Leach, 1815. IX. The *andraei* and *notabilis* species groups (Coleoptera, Hydraenidae). *Nachrichtenblatt Bayerischer Entomologen*, 41 (1), 7–21.
- Jäch, M.A. (1992b) Revision of the Palearctic species of the genus *Ochthebius* Leach VI. The *marinus* group (Hydraenidae, Coleoptera). *Entomologica Basiliensia*, 14 (1991), 101–145.
- Jäch, M.A. (1992c) Revision of the Palearctic species of the genus *Ochthebius* Leach X. The *punctatus* species group (Hydraenidae: Coleoptera). *Bulletin et Annales de la Société royale belge de l'Entomologie*, 128, 167–195.
- Jäch, M.A. (1993) Taxonomic revision of the Palearctic species of the genus *Limnebius* Leach, 1815 (Coleoptera: Hydraenidae). *Koleopterologische Rundschau*, 63, 99–187.
- Jäch, M.A. (1995) Hydraenidae (Coleoptera). In: Jäch, M.A. & Ji, L. (Eds.), *Water Beetles of China. Vol. I*. Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein, Wien, pp. 173–180.
- Jäch, M.A. (1998a) Annotated check list of aquatic and riparian/littoral beetle families of the world (Coleoptera). In: Jäch, M.A. & Ji, L. (Eds.), *Water Beetles of China. Vol. II*. Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein, Wien, pp. 25–42.
- Jäch, M.A. (1998b) Revision of the Palearctic species of the genus *Ochthebius* Leach XX. The *O. (Asiobates) rugulosus* Wollaston species complex (Coleoptera: Hydraenidae). *Koleopterologische Rundschau*, 68, 175–187.
- Jäch, M.A. (2004) Hydraenidae. In: Löbl, I. & Smetana, A. (Eds.), *Catalogue of Palaearctic Coleoptera. Vol. 2*. Apollo Books, Stenstrup, 102–122.
- Jäch M.A. & Balke, M. (2008) Global diversity of water beetles (Coleoptera) in freshwater. *Hydrobiologia*, 595, 419–442.
<http://dx.doi.org/10.1007/s10750-007-9117-y>
- Jäch, M.A. & Delgado, J.A. (2008) Revision of the Palearctic species of the genus *Ochthebius* Leach XXV. The superspecies *O. (s.str.) viridis* Peyron and its allies (Coleoptera: Hydraenidae). *Koleopterologische Rundschau*, 78, 199–231.
- Janssens, E. (1965) Revision de quelques Hydraenidae Méditerranéens (Coleoptera Hydrophiloidea). *Bulletin et Annales de la Société Royal d'Entomologie de Belgique*, 101, 89–96.
- Janssens, E. (1972) Essai sur la systématique des *Hydraena* des régions intertropicales. *Bulletin et Annales de la Société Royale Belge d'Entomologie de*, 108, 253–261.
- Kaddouri, A. (1986) *Révision des Hydraena du Maroc d'Algérie et de la Tunisie (Coleoptera, Hydraenidae)*. Thèse de doctorat, 3^e cycle, Université Paul Sabatier De Toulouse, 156 pp.
- Kasapoglu, A. & Erman, O. (2002) A faunistic study on *Asiobates* Thomson, 1859 (Hydraenidae, Polyphaga, Coleoptera) species. *Turkish Journal of Zoology*, 26, 363–366.
- Knisch, A. (1924) Hydrophilidae. In: Junk, W. & Schenkling, S. (Eds.), *Coleopterorum Catalogus. Vol. 14. part 79*. Junk, W., Berlin, 306 pp.
- Kugelann, J.G. (1794) Verzeichniss der in einigen Gegenden Preussens bis jetzt entdeckten Käfer-Arten, nebst kurzen Nachrichten von denselben. *Neustes Magazin für die Liebhaber der Entomologie, Herausgegeben von D.H. Schneider*, 1, 513–582.

- Kuwert, A. (1887) Uebersicht der europäischen *Ochthebius*- Arten. *Deutsche Entomologische Zeitschrift*, 31, 369–401, pls. 1–4.
- Kuwert, A. (1890) Bestimmungs–Tabellen der europäischen Coleopteren. XX Heft. Hydrophilidae. II. Abteilung: Sphaeridiini und Helophorini. *Verhandlungen des Naturforschenden Vereins in Brünn*, 28 (1889), 159–328.
- Lameere, A. (1900) Notes pour la classification des Coléoptères. *Annales de la Société Entomologique de Belgique*, 44 (9), 355–377, 1 pl.
- Latreille, P.A. (1802) *Histoire naturelle, générale et particulière des crustacés et des insectes. Ouvrage faisant suite à l'histoire naturelle générale et particulière, composée par Leclerc de Buffon, et rédigée par C.S. Sonnini, membre de plusieurs sociétés savantes. Familles naturelles des genres. Tome troisième.* F. Dufart, Paris, xii + 13–467 + [1] pp.
<http://dx.doi.org/10.5962/bhl.title.60678>
- Leach, W.E. (1815) *Entomology*. In: Brewster, D. (Ed.), *Brewster's Edinburgh Encyclopedia. Vol. IX. part I.* W. Blackwood, J. Waugh, etc., Edinburgh, pp. 57–172.
- Marshall, T. (1802) *Entomologia Britannica, sistens insecta Britanniae indigena, secundum methodum Linnaeanam disposita. Tomus. 1. Coleoptera.* Wilks & Taylor, Londini, xxxi + 548 + [1] pp.
<http://dx.doi.org/10.5962/bhl.title.65388>
- Mulsant, E. (1844a) *Palpicornes. Histoire naturelle des Coléoptères de France.* [Tome 3]. Maisson, Paris, vii + 197 + [7, errata + suppl.] pp. + 1 pl.
<http://dx.doi.org/10.5962/bhl.title.51568>
- Mulsant, E. (1844b) Description de quelques Palpicornes inédits. *Annales de la Société d'Agriculture de Lyon*, 7, 372–382.
- Orchymont, A. d' (1927) Coléoptères Hydrophilides recueillis en Egypte. *Bulletin de la Société Royale Entomologique d'Egypte*, 3–7.
- Orchymont, A. d' (1940) Palpicornia de Chypre: Voyage de M. A. Ball (Octobre – Novembre 1932); en annexe: Liste des espèces récoltées par Lui en Syrie et au Liban. *Mémoires du Musée Royal d'Histoire Naturelle de Belgique*, 2 (19), 1–35.
- Orchymont, A. d' (1942) Palpicornia (Coleoptera) IV. *Bulletin du Musée Royal d'Histoire Naturelle de Belgique*, 18 (62), 1–16.
- Orchymont, A. d' (1943) Contribution à l'étude du sous-genre *Ochthebius* (s. str.) Kuwert, 1887 (Coleoptera, Palpicornia, Hydraenidae). *Bulletin du Musée Royal d'Histoire Naturelle de Belgique*, 19 (10), 1–24.
- Peyerimhoff, P. de (1907) Liste des Coléoptères du Sinai. *L'Abeille*, 31, 1–48.
- Peyerimhoff, P. de (1924) Nouveaux Coléoptères du Nord-Africain. Quarante-huitième note: insectes des terres et des eaux salées, récoltés par MM. Seurat et Gauthier en Tunisie méridionale. *Bulletin de la Société Entomologique de France*, 158–161.
- Peyron, E. (1858) Catalogue des coléoptères des environs de Tarsous (Caramanie) avec la description des espèces nouvelles. *Annales de la Société Entomologique de France*, 6, 353–434.
- Reiche, L. (1869) Catalogue des coléoptères de l'Algérie et contrées voisines avec descriptions d'espèces nouvelles. *Mémoires de la Société Linnéenne de Normandie*, 15 (4), 1–44. [1865–1869]
- Rey, C. (1885) Descriptions de coléoptères nouveaux ou peu connues de la tribu des Palpicornes. *Annales de la Société Linnéenne de Lyon*, 31 (1884), 13–32.
- Rosenhauer, W.G. (1856) *Die Thiere Andalusiens nach dem Resultate einer Reise zusammengestellt, nebst den Beschreibungen von 249 neuen oder bis jetzt noch unbeschriebenen Gattungen und Arten.* T. Blaesing, Erlangen, viii + 429 pp., 3 pls.
<http://dx.doi.org/10.5962/bhl.title.66016>
- Sahlberg, J. (1903a) Entomologiska forskningsresor i Medelhafstrakterna och Centralasien företegna åren 1895–1896 samt 1898–1899. Resenberättelse. II. Resor i Palestina, Egypten, Tunisien och Algeriet. *Öfversigt af Finska Vetenskaps-Societetens Förhandlingar, Helsingfors*, 45 (17), 1–39.
- Sahlberg, J. (1903b) Coleoptera Levantina mensibus Februario et Martio in Palaestina et Aegypto inferiore collecta. *Öfversigt af Finska Vetenskaps-Societetens Förhandlingar, Helsingfors*, 45 (18), 1–36.
- Sahlberg, J. (1913) Coleoptera mediterranea orientalia, quae in Aegypto, Palaestina, Syria, Caramania atque in Anatolia occidentali anno 1904 collegerunt John Sahlberg et Unio Saalas. *Öfversigt af Finska Vetenskaps-Societetens Förhandlingar, Helsingfors, Series A*, 55 (19), 1–281.
- Salah, M. & Régil, J.A. (2014a) An annotated checklist of the aquatic Adephaga (Coleoptera) of Egypt I. Dytiscidae: Agabinae, Colymbetinae, Copelatinae, Dytiscinae and Laccophilinae. *Boletín de la Sociedad Entomológica Aragonesa*, 54, 145–155.
- Salah, M. & Régil, J.A. (2014b) An annotated checklist of the aquatic Adephaga (Coleoptera) of Egypt II. Dytiscidae: Hydroporinae. *Boletín de la Sociedad Entomológica Aragonesa*, 54, 293–305.
- Sharp, D. (1904) Water beetles (Dytiscidae & Hydrophilidae) of the Swedish Zoological Expedition to Egypt and the White Nile. In: Jägerskiöld, L.A. (Ed.), *Results of the Swedish Zoological Expedition to Egypt and the White Nile*, 10, pp. 1–10. [Library of the Royal University of Uppsala]
<http://dx.doi.org/10.5962/bhl.title.21727>
- Ślipiński, A., Leschen, R.A.B. & Lawrence, J.F. (2011) Order Coleoptera Linnaeus, 1758. In: Zhang, Z.-Q. (Ed), *Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness.* *Zootaxa*, 3148, 203–208.
- Stephens, J.F. (1829) *Illustrations of British entomology. Mandibulata. Vol. 2.* Baldwin & Cradock. London, 88 pp., 3 pls. [pp. 113–200, pls. 13–15]
- Storey, G. (1916) *List of Egyptian insects in the collection of the Ministry of Agriculture. No. 5.* Technical and Scientific Service (Entomological Section), Government Press, Cairo, 52 pp.

- Tawfik, M.M., Semida, F.M. Ahmed, R.S. & Orabi, G.M. (2013) Biodiversity of the Aquatic Entomofauna at St. Katherine Protectorate and Wadi Feiran, South Sinai, Egypt. *Asian Journal of Biological Sciences*, 6 (1), 40–53.
<http://dx.doi.org/10.3923/ajbs.2013.40.53>
- Thomson, C.G. (1859) *Skandinaviens Coleoptera, synoptiskt bearbetade. Tom. I.* Berlingska Boktryckeriet, Lund, [3] + 290 pp.
- Tkagakdh, M.I. (1909) Coléoptères égyptiens rapportés par M. Ivar Tkagakdh. *Bulletin de la Société entomologique d'Égypte*, 1–21.
- Tonapi, G.T. & Ozarkar, V.A. (1969) A New Record of *Hydraena quadricollis* Wollaston (Coleoptera: Hydrophilidae) from India. *The Coleopterists Bulletin*, 23 (1), 1–4.
- Trizzino, M., Jäch, M.A., Audisio, P., Alonso, R. & Ribera, I. (2013) A molecular phylogeny of the cosmopolitan hyperdiverse genus *Hydraena* Kugelann (Coleoptera, Hydraenidae). *Systematic Entomology*, 38 (1), 192–208.
<http://dx.doi.org/10.1111/j.1365-3113.2012.00654.x>
- Waltl, J. (1835) *Reise durch Tyrol, Oberitalien und Piemont nach dem südlichen Spanien*. Passau: Pustet'sche Buchhandlung, [8] + 247 pp. (Erster Theil) + 120 pp.
- Wollaston, T.V. (1854) *Insecta Maderensia; being an account of the insects of the islands of the Madeiran group*. Taylor & Francis, London, 43 + 634 pp. + 13 pls.
<http://dx.doi.org/10.5962/bhl.title.9060>
- Wollaston, T.V. (1857) *Catalogue of the coleopterous insects of Madeira in the collection of the British Museum*. Taylor & Francis, London, 16 + 234 pp.
<http://dx.doi.org/10.5962/bhl.title.9900>
- Wollaston, T.V. (1864) *Catalogue of the coleopterous insects of the Canaries in the collection of the British Museum*. British Museum, London, xiii + 648 pp.
<http://dx.doi.org/10.5962/bhl.title.9850>
- Zalat, S., Saleh, R. & Abo-Ghalia, A. (1992) Taxonomic and ecological keys of aquatic insects in Ismailia region. *Journal of the Egyptian German Society of Zoology (Entomology)*, 9 (D), 259–275.