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Dragonflies from the Western High Atlas, Morocco, with the first records of *Pyrrhosoma nymphula* in the High Atlas (Odonata: Coenagrionidae)

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Abstract

Fifteen species of Odonata were recorded during a short trip to the central part of the Moroccan Western High Atlas in May/June 2012. *Pyrrhosoma nymphula* was recorded in the High Atlas for the first time. *Cordulegaster princeps* was found in series of localities, west of pass Tizi-n-Test for the first time.

Zusammenfassung

Libellen aus dem westlichen Hohen Atlas, Marokko, mit den ersten Nachweisen von *Pyrrhosoma nymphula* im Hohen Atlas (Odonata: Coenagrionidae) – Fünfzehn Libellenarten wurden während eines Aufenthalts im zentralen Teil des marokkanischen westlichen Hohen Atlas im Mai und Juni 2012 gefunden. *Pyrrhosoma nymphula* wurde im Hohen Atlas zum ersten Mal aufgezeichnet. *Cordulegaster princeps* wurde an vielen Lokalitäten gefunden, darunter zum ersten Mal westlich des Passes Tizi-n-Test.

Introduction

Morocco, including the High Atlas Mountains, has been rather well investigated concerning the Odonata (e.g., Jacquemin & Boudot 1999; P. Schrijvershof 2006 in Observado.org 2012; Boudot 2008; Boudot et al. 2009; Juillerat & Monnerat 2009; Boudot & de Knijf 2012). Records from the Western High Atlas (Haut Atlas Occidental) – the part of the mountains between the Atlantic Ocean and the Tizi-n-Tichka pass – are concentrated on the Jebel Toubkal region, the Nfiss valley, the Sous valley and the Atlantic coast. However, no odonatological record has yet come from the central part of the Western High Atlas between the Tizi Maachou (1,700 m a.s.l.) and the Tizi-n-Test (2,100 m a.s.l.) passes.

Methods

Nine localities were visited from 30 May to 3 June 2012 during a field trip to Morocco, from Argana (70 km NE of Agadir) through the Plateau du Tichka and the Nfiss valley to Tizi-n-Test. Photographs of many species were taken in the field. All collected exuviae are deposited in the author's collection. All data are additionally presented in the online database <observado.org>.

List of localities

The localities visited (Fig. 1) are listed below, together with their geographic coordinates in decimal degrees in the international geodetic system WGS84, their altitude in meters above sea level and the date of the visit. Locality names agree primarily with the 1:250,000 US maps of Morocco, freely available at <http://www.lib.utexas.edu/maps/ams/north_africa/>. Names from the 1:800,000 Marco Polo road maps or NH-29-07 Taroudant 1:250,000 (1980) are indicated in brackets where relevant.

Loc. 1. Asif n' Ait Moussa river, 5 km S of Timezgadiouine, partially dried-up river bed with sections of running as well as still water, 30.848°N, 9.071°W; 827 m a.s.l.; 30-v-2012, 11:00-13:00 h WEST. The only locality visited south of the main range of the High Atlas.

Loc. 2. Afensou, 1 km SW, a spring area and a small brook (width 20 cm, depth 5 cm), valley overgrown and shadowed by trees and bushes, 30.933°N, 8.770°W, 2,323 m a.s.l.; 31-v-2012, 09:00 h WEST.

Loc. 3. Agadir (Ait Zemlal), 1 km NE, brook (width 100 cm, depth 15-50 cm), valley overgrown and shadowed by trees and bushes, steeper sections with fast running water as well as stretches with still water, 30.957°N, 8.703°W, 1,562 m a.s.l.; 31-v-2012, 11:00 h WEST. (Fig. 2)

Loc. 4. (Targa ou Fella), 5 km W, dried-up river bed with a 300 m stretch with flowing water (width 40 cm, depth 5-10 cm); sections with still water; 30.933°N, 8.673°W, 1,955 m a.s.l.; 31-v-2012, 14:00 h WEST

Loc. 5. Plateau du Tichka, spring area of the Nfiss river, 15 km E of Tiouialine, small brook (width 20 cm, depth 5 cm), not shadowed neither overgrown by woods, fully exposed to sunshine, 30.917°N, 8.596°W, 2,796 m a.s.l.; 01-vi-2012, 10:00 h WEST

Loc. 6. Plateau du Tichka, river Nfiss, 12 km E of Tiouialine, brook (width 150 cm, depth 30-150 cm). Steeper sections alternated with sections with still water, shadowed and overgrown by shrubs and trees, 30.903°N, 8.573°W, 2,338 m a.s.l.; 01-vi-2012, 11:00-12:00 h WEST

Loc. 7. Left tributary of the river Nfiss, 8 km E of Tiouialine, brook (width 70 cm, depth 30 cm) shadowed by shrubs, 30.905°N, 8.546°W, 2,167 m a.s.l.; 01-vi-2012, 17:00 h WEST

Loc. 8. Imlil, river Nfiss, river (width 3 m, depth 30-150 cm), steeper sections alternated with sections with still water, trees and shrubs at the embankments, 30.891°N, 8.457°W, 1,723 m a.s.l.; 02-vi-2012, 11:00-12:00 h WEST

Loc. 9. Ijjoukak (Ijoukak), Asif n' Ait Ahmed (Oued Agoundis) river, almost dried-up, 30.998°N, 8.1576°W, 1,197 m a.s.l.; 03-vi-2012, 11:00 h WEST

Loc. 10. Ouirgane, Barrage Ouirgane, dam, at the time of the visit 10 m lower water level than commonly operating level, 31.178°N, 8.082°W, 877 m a.s.l.; 03-vi-2012, 11:00 h WEST

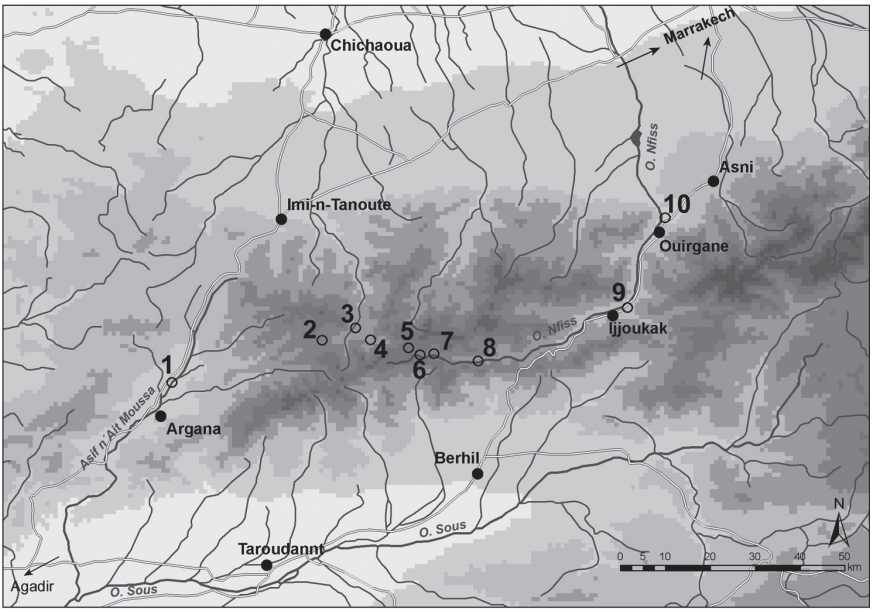

Figure 1. Map of of the Western High Atlas, Morocco, with localities visited during this study. – Abbildung 1: Karte des westlichen Hohen Atlas, Marokko, mit besuchten Lokalitäten.

Figure 2. Brook near Agadir (Ait Zemlal), Morocco, habitat of *Pyrrhosoma nymphula* and *Cordulegaster princeps* (31-v-2012). – Abbildung 2: Bach bei Agadir (Ait Zemlal), Marokko, Lebensraum von *Pyrrhosoma nymphula* und *Cordulegaster princeps* (31.05.2012).

List of recorded species

Fifteen species pertaining to six families were recorded and are listed below, together with the corresponding localities and some annotations.

***Calopteryx haemorrhoidalis* (Vander Linden, 1825)**
Loc. 3 (1♂), 6 (2♂ 1♀), 8 (common)

***Coenagrion caerulescens* (Fonscolombe, 1838)**
Loc. 1 (common), 3 (common), 8 (common), 9 (common)

***Enallagma deserti* (Selys, 1840)**
Loc. 10 (common, ovipositing)

***Ischnura graellsii* (Rambur, 1842)**
Loc. 3 (5♂ 5♀)

***Ischnura saharensis* Aguesse, 1958**
Loc. 1 (1♂ 2♀)

***Pyrrhosoma nymphula* (Sulzer, 1776)**
Loc. 3 (8♂ 2♀, copula), 4 (10♂ 5♀, copula)

***Anax imperator* Leach, 1815**
Loc. 1 (1♂), 4 (1♂), 9 (1♂)

***Cordulegaster princeps* Morton, 1916**
Loc. 2 (1♂, patrolling flight), 3 (3♂, patrolling flight), 4 (5♂, 15 exuviae), 5 (1 exuvia), 6 (3♂, 5 exuviae), 7 (10 exuviae), 8 (4♂ 1♀, 3 exuviae)

***Onychogomphus uncatus* (Charpentier, 1840)**
Loc. 3 (common), 6 (common), 8 (common, 100 exuviae)

***Paragomphus genei* (Selys, 1841)**
Loc. 1 (5♂, 1 exuvia)

***Brachythemis impartita* (Karsch, 1890)**
Loc. 10 (common, incl. immatures)

***Orthetrum chrysostigma* (Burmeister, 1839)**
Loc. 1 (common), 3 (common), 4 (3♂), 6 (common), 8 (common), 9 (common)

***Trithemis annulata* (Palisot de Beauvois, 1807)**
Loc. 1 (common), 6 (1♂), 10 (common incl. exuviae)

***Trithemis arteriosa* (Burmeister, 1839)**
Loc. 1 (2♂)

***Trithemis kirbyi* Selys, 1891**
Loc. 1 (common), 8 (common)

Discussion

The 15 species that were recorded represent 24 % of the 63 species confirmed for the whole of Morocco (see Boudot et al. 2009; Boudot & De Knijf 2012). Records of *Pyrrhosoma nymphula* and *Cordulegaster princeps* are the most notable.

Pyrrhosoma nymphula is considered to be a glacial relict within Morocco (Boudot 2008; Boudot & de Knijf 2012). Until now it has been known only from ten localities from the Rif and the Middle Atlas mountain ranges (Jacquemin 1994; Jacquemin & Boudot 1999; Boudot 2008). Boudot & De Knijf (2012) found it at one locality in eastern Morocco, which was separated from the others by the Moulouya valley (Fig. 3). My records of *P. nymphula* from the Oued Seksaoua basin are the first findings from the High Atlas Mountains. They are approximatively 450 km away from the closest localities in the Middle Atlas as the crow flies. The species was recorded at brooks in valleys shaded by trees and shrubs, especially at the stretches with still and deeper water. The altitude of the localities ranges between 1,560 and 1,955 m above sea level.

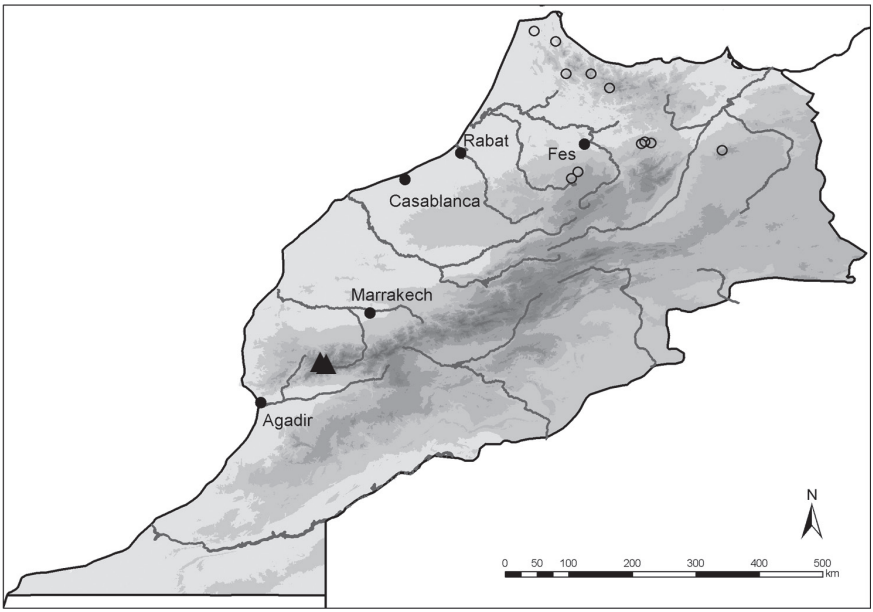

Figure 3. Hitherto known records of *Pyrrhosoma nymphula* in Morocco. – Abbildung 3: Bisher bekannte Nachweise von *Pyrrhosoma nymphula* in Marokko. ○ literature data, Literaturangabe; ▲ this study, diese Arbeit.

Cordulegaster princeps is the only endemic species of the Moroccan High and Middle Atlases. Until now, known records in the High Atlas derive mainly from the Jebel Toubkal region and from the surroundings of the Tizi-n-Tichka pass. There are also some new records from the central part of the High Atlas (Boudot & De Knijf 2012; Fig. 4). The presently acknowledged westernmost locality is situated at a right tributary of the river Nfiss between Ijjoukak and Tizi-n-Test (Boudot 2008). *Cordulegaster princeps* has not been known west of the Tizi-n-Test pass. During my field trip, this species was recorded at many brooks situated west of the Tizi-n-Test: river Nfiss and its tributaries as well as west of the Tizi-n-Aslim pass within the basin of river Oued Seksaoua further downstream called Oued Chichoua. Literature data (Van Pelt 2006) state that, in contrast to *C. boltonii*, *C. princeps* does not develop in tiny streams. Contradicting these statements, the developmental (life) cycle of *C. princeps* was confirmed by finding exuviae at virtually all types of flowing waters – tiny streams 20 cm wide and 5 cm deep at the spring areas as well as drying-up streams with limited stretches of permanently running water or even smaller rivers. This was already emphasized by Boudot (2008). Some localities were heavily shadowed and overgrown by woods, while

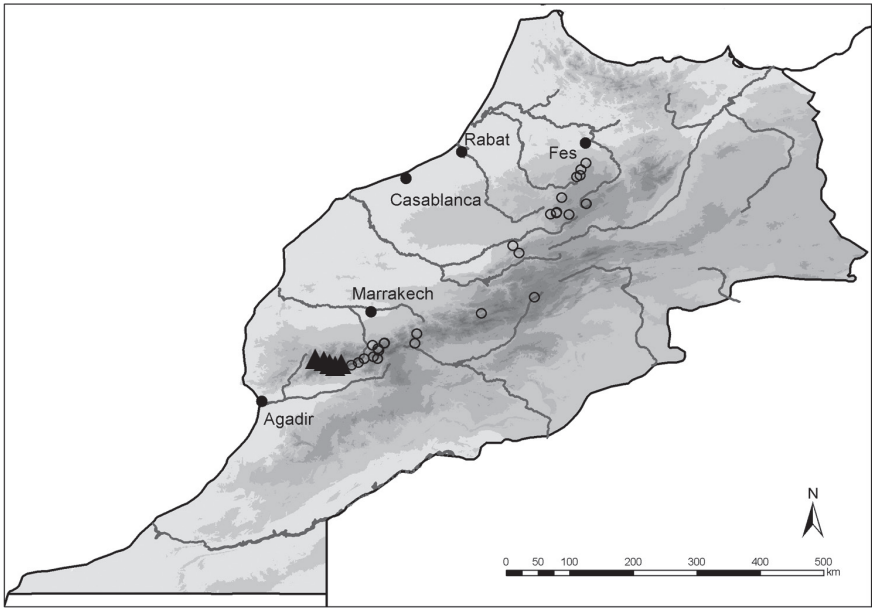

Figure 4. Hitherto known records of *Cordulegaster princeps* in Morocco. – Abbildung 4: Bisher bekannte Nachweise von *Cordulegaster princeps* in Marokko. ○ literature data, Literaturangabe; ▲ this study, diese Arbeit.

others had grassy embankments and therefore were fully exposed to sunshine. The altitude of the localities ranges from 1,560 to 2,800 m a.s.l. Besides the localities above, individual adults of *C. princeps* were spotted hunting in the afternoons in virtually the whole valley west of the Targa ou Fella, e.g. along paths.

Other less common species, recorded within the wider region, are: *Enallagma deserti*, *Paragomphus genei*, *Brachythemis impartita* and *Trithemis arteriosa.* More common species, present at most localities, and often in high numbers, are in particular: *Coenagrion caerulescens*, *Anax imperator*, *Onychogomphus uncatus* and *Orthetrum chrysostigma.*

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