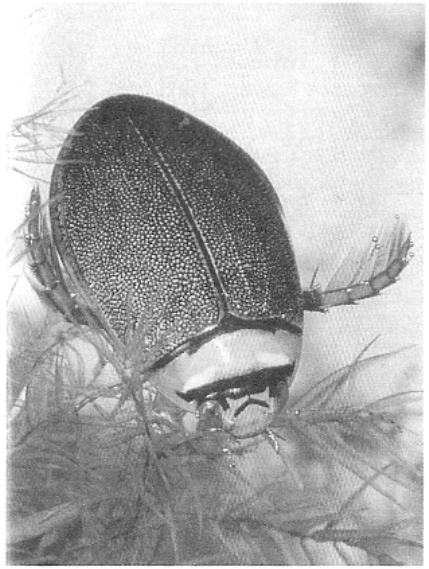
WINTER OBSERVATIONS OF *GRAPHODERUS BILINEATUS* AND SOME OTHER WATER BEETLES

by Bram Koese & Jelle Tienstra



The dytiscid beetle *Graphoderus bilineatus* attained increasing attention over the last couple of years, due to its protected status on the European habitat directive. Much data have been collected about its distribution, optimal catching techniques, larval identification and some aspects of its life cycle (Cuppen *et al.* 2006, Hendrich & Balke 2000, Foster 1996, Holmen 1993, Koese & Cuppen 2006). Until now, the hibernation of *G. bilineatus* was subject to speculation due to the lack of winter observations, although earlier studies consistently suggested an overwintering in the water rather than on the land.

Earlier assumptions about the hibernation were made by Holmen (1993). He found inactive specimens of two related species, *G. cinereus* (L.) and *G. zonatus* (Hoppe), amongst submerged mosses in winter and assumed that *G. bilineatus* would hibernate in a similar way. Also, Galewski (1990) was never able to find any *Graphoderus* species in forest litter in winter, where he found many other dytiscid species such as the similar-sized genus *Hydaticus*. However, he did find adult *Graphoderus* specimens buried in bottom sediment under *Sphagnum* in dried-up ponds in summer. Based on this observation he suggested that members of the genus may hibernate similarly.

Here, we report the findings of buried, inactive specimens of both *G. bilineatus* and *G. cinereus* in January and March 2009. Additionally, we caught some active specimens of *G. cinereus* under ice, but not during the extensive frost period.

Hibernation in the Netherlands

The Dutch winter of 2008-2009 was the coldest since 1997. Temperatures down to minus 20˚C resulted in a considerable ice cover (>10 cm at many places) for about two weeks and a new generation of kids privileged with the sensation of ice-skating. On 11 January 2009 (which turned out to be the last day of the extensive frost-period) an excursion was made to Luinjeberd in the province of Friesland in the north of the Netherlands and a known 'hotspot' for *G. bilineatus*. The focal area was a particular ditch, where relatively large densities (eight specimens of *G. bilineatus* and ten of *G. cinereus*) were found in a single dead end on 15 October 2008 during a careful inventory (Koese *et al.* 2008).

A brief inspection of the frozen ground and vegetation on the bank revealed no water beetles. Then a surface of 5m² (a stretch of one metre of ice from the ditch with a width of 5 metres) was made ice-free with a sledge. Despite the large densities in October, not a single *Graphoderus* appeared from the mud or vegetation from the ice cleared water during intensive netting. Of the larger aquatic beetles, only one male of *Hydrophilus piceus* (L.) and two third instar larvae of *Ilybius fenestratus* (Fab.) turned out to be present under the 11 cm thick ice cover.

While leaving the area disillusioned, another dead end came in sight with a permanent trap for musk rats placed in the centre. A final attempt was made here by removing the ice and the trap and collecting the debris inside. The type of trap concerned is a so called 'fake tunnel' (schijnduiker) which resembles an underground connection between two waterways. However the tunnel leads literally and figuratively to a dead end after about 80 centimetres. To our surprise, the (unfrozen) mud revealed two specimens of *Graphoderus*: a female of *G. bilineatus* and a male of *G. cinereus*. The specimens were inactive, looking dead, but started to move their legs after ten minutes at room temperature (and 5 minutes' transportation).

Another visit was made to the area on 13 March 2009. By then the ice had been gone for more than a month, but the water temperature had not exceeded 10˚C (based on reference data). A total of 22 traps (19 bottle and 3 'molchreuse' traps [for amphibians] baited with chicken liver) were placed at locations with recent records of *G. bilineatus.* Six species were caught: *Acilius canaliculatus* (Nicolai) (2), *Acilius sulcatus* (L.) (1), *Colymbetes fuscus* (L.) (1), *Dytiscus marginalis* L. (7), *Hydrophilus piceus* (3) and *Rhantus suturalis* (Macleay) (2). This suggests that some genera that are normally very abundant here (*Cybister* and *Graphoderus*) were largely inactive by 13 March.

Again, no *Graphoderus* could be found at the 'Oktober-spot' either using nets or traps, but again the presence of both *Graphoderus* species could be verified in the dead corner around the musk rat trap by using a net. In total 20 inactive specimens of *G. cinereus* (not sexed) and 6 inactive specimens of *G. bilineatus* (2 male, 4 female) were found. With careful 'local' netting it could be proved that at least three specimens of *G. bilineatus* were hibernating deeply in between the loose, muddy roots of a 'floating' clump of the Yellow Flag (*Iris pseudacorus*) about 20-50 centimetres below the water surface. Yellow flag and the Greater Tussock Sedge (*Carex paniculata*) dominated the vegetation here. All other *Graphoderus* specimens most likely originated from the roots of one of both plant species (or directly from the mud at the bottom).

All observations between autumn and early spring 2008-2009 were summarised in Table 1.

Conclusions

The few winter observations of in the Netherlands from 2008/2009 confirm earlier assumptions and suggest that both *G. bilineatus* and *G. cinereus* generally hibernate in the (mud of the) water as an adult beetle. The observations also show that suitable hibernation sites could attract relatively large concentrations of *G. bilineatus* and *G. cinereus* mixed together (here: 26 specimens).

We found some active specimens of *G. cinereus* throughout the whole winter, but only during periods of mild frost (thin ice cover, nearby open water available). We didn't catch any active specimen of *G. bilineatus* between 15 October and 21 March, but since *G. bilineatus* is harder to find than *G. cinereus*, this might be a sampling effect.

References

CUPPEN JGM, KOESE B & SIERDSEMA H 2006. Distribution and habitat of *Graphoderus bilineatus* in the Netherlands (Coleoptera: Dytiscidae). *Nederlandse Faunistische Mededelingen* **24** 29-40.

FOSTER G N 1996. *Graphoderus bilineatus* (De Geer, 1774). In: P J van Helsdingen, L Willemse & M C D Speight (eds): Background Information on Invertebrates of the Habitats Directive and the Bern Convention. Part 1, 40-48. European Invertebrate Survey.

GALEWSKI K 1990. The larvae of Central European species of *Graphoderus* Dejean (Coleoptera, Dytiscidae). *Polskie Pismo Entomologiczne* **60** 25-54.

HENDRICH L & BALKE M 2000. Verbreitung, Habitatbindung, Gefärdung und mögliche Schutzmaßnahmen der FFH-arten *Dytiscus latissimus* Linnaeus, 1758 (Der Breitrand) und

Graphoderus bilineatus (De Geer, 1774) in Deutschland (Coleoptera: Dytiscidae). *Insecta, Berlin* **6** 98-114.
HOLMEN M 1993. Fredere insecter I Danmark. Del 3: Biller knyttet til vand. *Entomologiske Meddelelser* **61** 117-134.
KOESE B & CUPPEN J G M 2006. Sampling methods for *Graphoderus bilineatus* (Coleoptera: Dytiscidae). *Nederlandse Faunistische Mededelingen* **24** 41-47.
KOESE B, BOER E P de, CUPPEN J G M, SCHUT J & TIENSTRA J 2008. De Gestreepte waterroofkever in Zuidoost-Friesland: inhaalslag 2008. Leiden: EIS-Nederland.

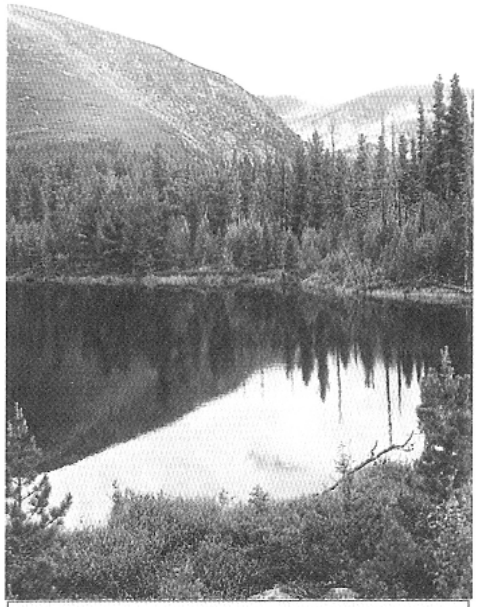
Table 1 Summary of winter net sampling of *Graphoderus* (A= active; I = inactive)

Date	Location	Nos	State	Remarks
Graphoderus bilineatus				
15 October 2008	Friesland Luinjeberd	18	A	last day of 'late summer' inventory. Beetles still abundant and active between loose plant debris in three different ditches. Up to 8 specimens caught at a single spot
11 January 2009	Friesland Luinjeberd	1	I	in unfrozen mud from muskrat trap. Last day of extensive frost period. Completely ice covered (> 10 cm)
13 March 2009	Friesland Luinjeberd	2♂ 4♀	I	at least 3 specimens deeply between roots of *Iris pseudacorus*
19 March 2009	Utrecht Westbroek	0	I?	2 hour search at a well known 'hotspot' revealed no specimens
21 March 2009	Zuid-Holland Nieuwkoop	1 ♀	A	between loose plant debris in dead end of deep, 4 m. wide ditch
22 March 2009	Noord-Holland Loosdrecht	7♂ 4♀	A	between loose plant debris in dead ends of 4 different ditches
Graphoderus cinereus				
15 October 2008	Friesland Luinjeberd	20	A	abundant and active between loose plant debris. Up to 10 specimens caught at a single spot
12 December 2008	Zuid-Holland Nieuwkoop	1♂	A	in water under thin local ice-cover
18 January 2008	Groningen Haren	1♀	A	in water under thin local ice-cover
8 February 2009	Groningen Onnen	1♀	A	in water under thin local ice-cover
13 March 2009	Friesland Luinjeberd	20	I	in water between mud and roots (mainly *I. pseudacorus* and *C. paniculata*) in end of 5 m wide ditch
13 March 2009	Friesland Luinjeberd	2♂	A	in corner of large lake fed with spring water, few meters from previous location
19 March 2009	Utrecht Westbroek	2♂ 2♀	I	dead end of heavy shaded ditch (2 m) in water between roots and leaf litter
19 March 2009	Utrecht Tienhoven	2♂	A	in small ditch (1 m) between loose plant debris in dead end

Received August 2009

HYDRADEPHAGA FROM THE KHAMAR-DABAN RANGE IN EAST SIBERIA

by Pyotr N Petrov

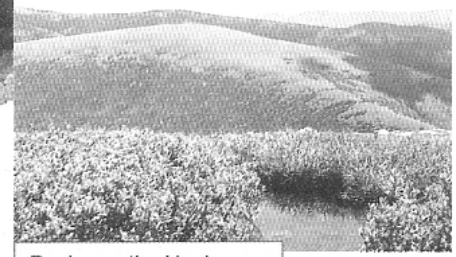


Lake Bannoye

In July 2008 I participated in a little expedition to the Khamar-Daban Range, bordering the southern coast of Lake Baikal. The expedition was organised and headed by my friend Polina Volkova (Moscow South-West High School) with the purpose of studying the flora of the Baikal State Nature Reserve, especially of the southern macroslope of the range, which is harder to reach than the northern macroslope. While the botanical group roamed the famous mountain range collecting and recording plants, I made solitary excursions on a somewhat smaller scale, collecting water beetles by net and with bottle traps (using all the four or five plastic bottles I had, but unable to get more, because the area is totally uninhabited – it's easier to see a wild reindeer, of which we saw several, than a human being, of whom over the first two weeks of the expedition we saw none, except ourselves).

Administratively the examined area belongs to the Buryatia Republic (Russia). The nature reserve includes a portion of the Khamar-Daban Range in the south-western part of the republic, south of the village of Tankhoy (where the headquarters of the reserve are), and south of the Trans-Siberian railroad, which runs along the southern coast of Baikal. The water bodies and watercourses where I collected the beetles in the period between 11-31 July 2008, are listed below. Names in quotation marks are provisional (of my own invention); others are found on maps and/or used by the staff of the reserve.

Pyotr with his net



Pool near the Henhouse