



*Eucoberesia diaphana* (Draparnaud, 1805)

February 2017

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## **Fourth report on Vitrinidae (Gastropoda) and other molluscs in Parc national de la Vanoise in the French Alps. Report from a short research in August 2016.**

### **Résumé**

En août 2016, une étude a été menée sur la présence des Vitrinidae dans une partie du Parc national de la Vanoise. Dans la zone sud du Parc, vingt sites ont été échantillonnés. Des recherches ont été faites sur les animaux vivants et les coquilles vides. Les autres mollusques présents ont aussi été recensés. Au total, 39 espèces ont été observées, y compris quatre espèces de Vitrinidae: *Vitrina pellucida* (Semilimace commune), *Phenacolimax stabilei* (Semilimace des alpages), *Eucoberesia nivalis* (Semilimace des neiges) et *Oligolimax annularis* (Semilimace globuleuse).

Key words: Parc national, Vanoise, Gastropoda, *Eucoberesia*, *Vitrina*, *Phenacolimax*, *Oligolimax*.

### **Introduction**

In July 2012, July 2013 and July & August 2015, parts of Parc national de la Vanoise in the French Alps were investigated on the occurrence of Molluscs. In these earlier studies the attention was focussed on Vitrinidae (Margry, 2013a, 2014, 2016a, 2016b; Margry & Thomas, 2016). Because of a personal interest in glass snails (Margry, 2013b, 2015, 2016c), the study was continued in August 2016. Again, an emphasis was placed on vitrinid semislugs.

Data on molluscs in the French Alps are available in several references (Falkner et al., 2002; Audibert, 2010a, 2010b; Welter-Schultes, 2012; Audibert & Bertrand, 2015). However, there is still uncertainty on the occurrence of some Vitrinidae species in the French Alps. Some species are found close to the French border in neighbouring countries; in Italy (*Phenacolimax locardi*) and Switzerland (*Eucoberesia pegorarii*) (Gavetti et al., 2008; Boschi, 2011). The status of threat on the Red List (Cuttelod et al., 2011), remained undetermined for some vitrinid species due to insufficient data available.

Research performed in the last few years confirms that it is worthwhile to keep searching for new records of species (Brugel, 2014; Margry & Thomas, 2016). Because the obtained scientific permit for the present study also allows for the collection of other molluscs, a list of species was made in the same way as previous years. The current report describes the study performed in the southern part of the National Park.

### **Methods**

In 2016 the National Park was visited between August 6<sup>th</sup> and 19<sup>th</sup> by Kees and Ingrid Margry. The sampling areas were in the region of Aussois, Entre Deux Eaux, Termignon, Bessans, Col de l'Iseran and Bonneval-sur-Arc (Table 1, Figs 1-15). The sampling method was the same as previous years (Margry, 2013a, 2014, 2016a). On August 9, 10 and 11, Alain and Michelle Thomas were joining. On August 9<sup>th</sup>, Joël Blanchemain from the National Parc brought us with his car to the centre of the National Park and joined us during this day as well.

Living Vitrinidae were preserved in alcohol 70%. The shell was only removed if this was required for identification. Slugs were collected incidentally and dissected and identified by Alain Thomas.

For identification of the species Forcart (1944), Umiński (1975), Grossu (1983), Kerney et al. (1983), Wolf & Rähle (1987), Fechter & Falkner (1990), de Winter (1990), Gittenberger & Bank (1996), Wiktor (1996, 2004), Gittenberger et al. (1998), Turner et al. (1998), Hausser (2005), Nardi et al. (2007), Gavetti et al. (2008), Boschi (2011), Egorov (2011), Gargominy & Ripken (2011), Giusti et al. (2011), Formenti (2012), Bank & Gittenberger (2013), Wiese (2014) and Audibert & Bertrand (2015) were used.

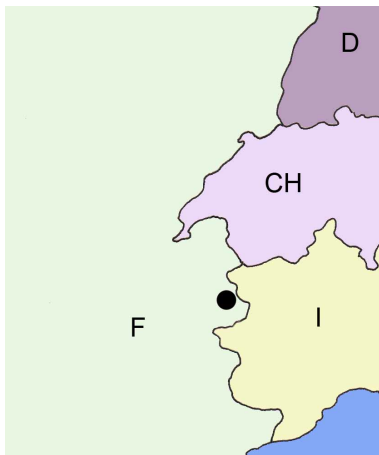


Fig. 1. The research area in the French Alps. Black circle = Parc national de la Vanoise.

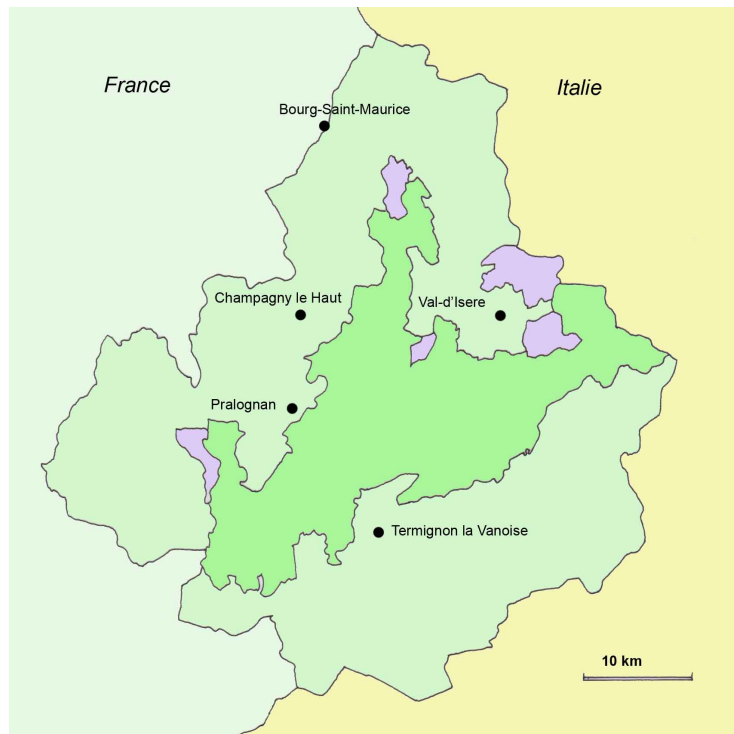


Fig. 2. Parc national de la Vanoise. dark green = National Park; light green = buffer zone; purple = Nature reserve.

| Locality         | sampling site                  | Fig. | Coordinates                   | Altitude (m) | Vegetation belt <sup>1</sup> | sampling nr. |
|------------------|--------------------------------|------|-------------------------------|--------------|------------------------------|--------------|
| Aussois          | Source de Fournette            | 4    | 45°14'54.7" N – 06°45'43.2" E | 1900         | montane                      | 20160806.1   |
|                  | chez Parking Monolithe         |      | 45°14'50.9" N – 06°45'51.6" E | 1750         | montane                      | 20160806.2   |
| Entre Deux Eaux  | Torrent de la Rocheure         | 5    | 45°21'40.3" N – 06°50'30.2" E | 2052         | alpine                       | 20160809.1   |
|                  | Chapelle St-Pierre             | 6    | 45°22'03.7" N – 06°50'16.8" E | 2101         | alpine                       | 20160809.2   |
|                  | Pont de Croé-Vie               |      | 45°22'38.1" N – 06°49'58.1" E | 2108         | alpine                       | 20160809.3   |
|                  | La Civièrè                     |      | 45°22'18.6" N – 06°49'55.3" E | 2113         | alpine                       | 20160809.4   |
|                  | La Civièrè                     | 7    | 45°22'10.5" N – 06°49'59.7" E | 2077         | alpine                       | 20160809.5   |
|                  | Torrent de la Rocheure         | 8    | 45°21'35.6" N – 06°50'06.0" E | 1996         | alpine                       | 20160809.6   |
| Termignon        | "Lac des Limnées" <sup>2</sup> | 9    | 45°20'41.6" N – 06°49'53.3" E | 2333         | alpine                       | 20160809.7   |
|                  | Bellecombe                     |      | 45°19'37.6" N – 06°49'36.0" E | 2342         | alpine                       | 20160810.1   |
|                  | Lac du Lait <sup>3</sup>       | 10   | 45°18'52.9" N – 06°48'51.7" E | 2179         | alpine                       | 20160810.2   |
| Bessans          | Les Côtes le Villaron          | 11   | 45°20'04.2" N – 07°00'18.6" E | 1905         | alpine                       | 20160811.1   |
|                  | Les Côtes le Villaron          | 11   | 45°20'11.9" N – 07°00'21.0" E | 1990         | alpine                       | 20160811.2   |
|                  | Les Côtes le Villaron          | 11   | 45°20'22.0" N – 07°00'22.9" E | 2102         | alpine                       | 20160811.3   |
|                  | Les Côtes le Villaron          | 11   | 45°20'17.2" N – 07°00'19.2" E | 2024         | alpine                       | 20160811.4   |
| Col de l'Iseran  | Col de l'Iseran                | 12   | 45°25'11.6" N – 07°02'35.8" E | 2739         | nival                        | 20160812.1   |
| Bonneval-sur-Arc | Sentier Balcon                 | 15   | 45°25'14.1" N – 07°07'25.7" E | 2761         | nival                        | 20160819.1   |
|                  | Sentier Balcon                 | 13   | 45°25'18.6" N – 07°02'22.8" E | 2801         | nival                        | 20160819.2   |
|                  | Sentier Balcon                 | 14   | 45°25'01.3" N – 07°06'18.3" E | 2756         | nival                        | 20160819.3   |
|                  | Sentier Balcon                 |      | 45°23'33.9" N – 07°04'28.9" E | 2690         | nival                        | 20160819.4   |

Table 1. Localities and sampling sites, all within the boundaries of Parc national de la Vanoise.

<sup>1</sup> Vegetation belt according to Nagy & Grabherr (2009). montane = forest, alpine = alpine meadow, nival = scree, rocks and snow level, scant patchy vegetation.

<sup>2</sup> "Lac du Lait" as indicated on de map 'cartes IGN' is called "Lac des Limnées" by the people of Termignon

<sup>3</sup> The real "Lac du Lait" is a bog, situated just downstream Lac Blanc.

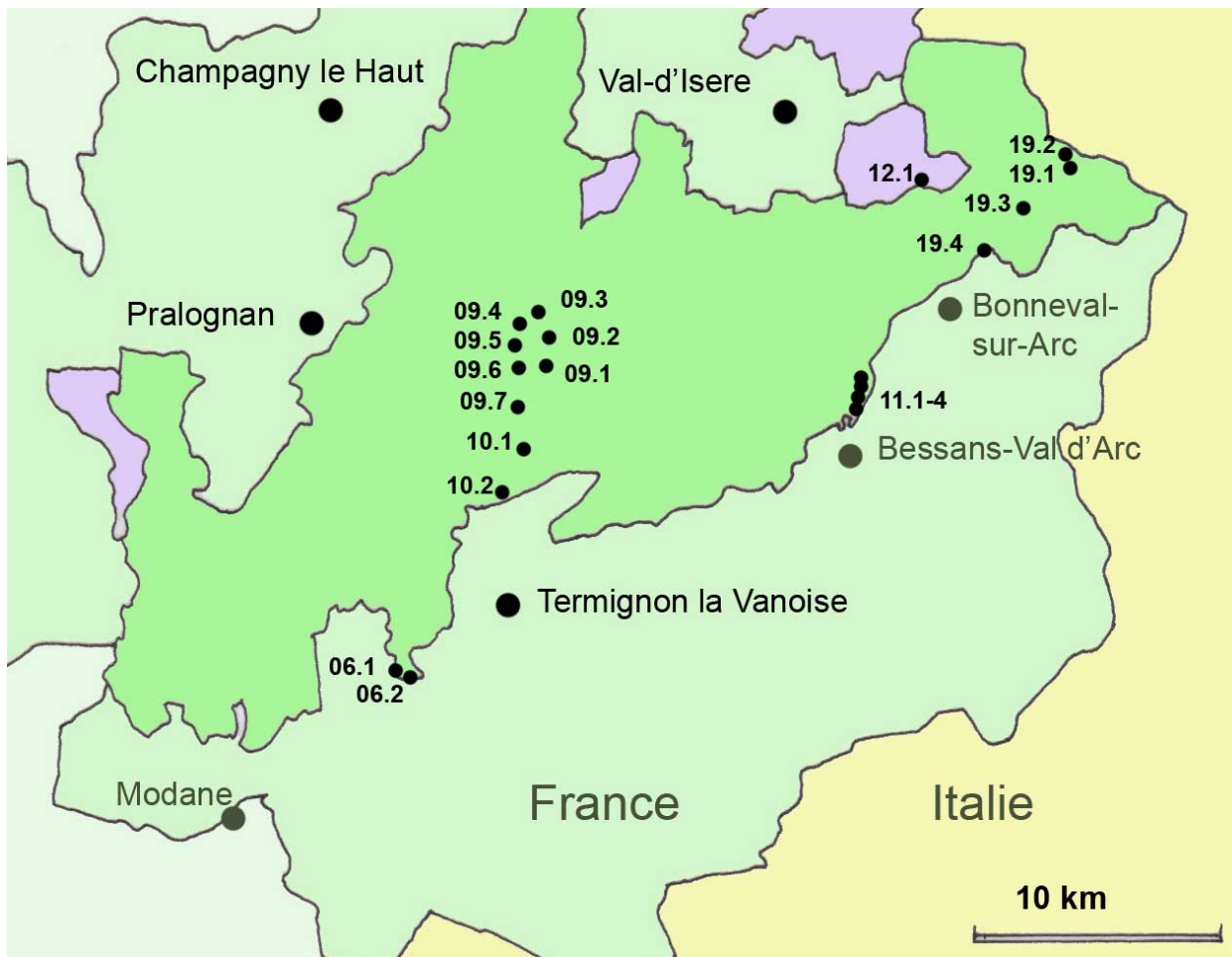


Fig. 3. The southern part of Parc national de la Vanoise with the 20 sampling sites.



Fig. 4. Sampling site 20160806.1 (photo KM)

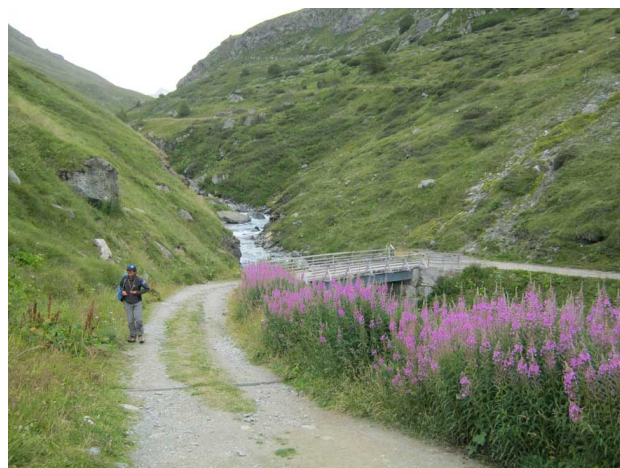


Fig. 5. Sampling site 20160809.1 (photo KM)

The nomenclature used is according to Gargominy et al. (2011). Please refer to appendix 1a and 1b for the French names.

Measurements of the shells were taken with a calliper to the nearest 0.1 mm. The collected shells and alcohol samples are kept in the collection of the author and of Alain Thomas. Photos are taken by Ingrid Margry (IM), Kees Margry (KM), Alain Thomas (AT) and Michelle Thomas (MT). Drawings are made by Kees Margry.



Fig. 6. Sampling site 20160809.2 (photo MT)



Fig. 8. Sampling site 20160809.6 (photo IM)



Fig. 7. Sampling site 20160809.5 (photo IM)



Fig. 9. Sampling site 20160809.7 (photo AT)



Fig. 10. Sampling site 20160810.2 (photo IM)

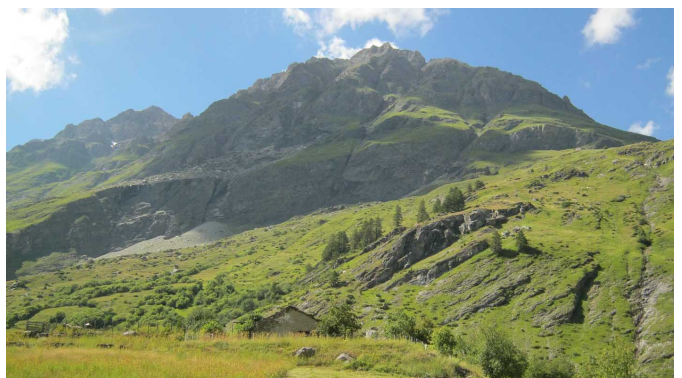


Fig. 11. Sampling site 20160811.1-4 (photo KM)



Fig. 12. Sampling site 20160812.1 (photo KM)

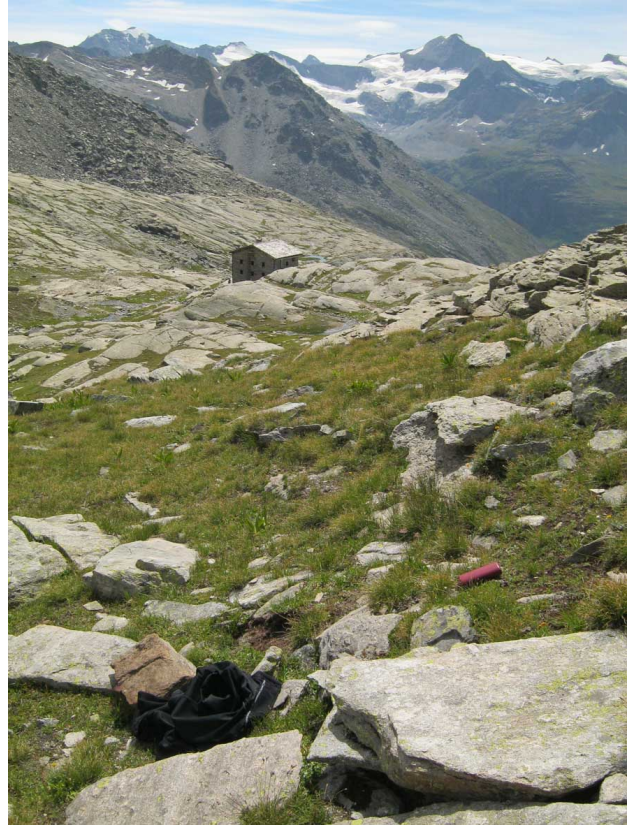


Fig. 13. Sampling site 20160819.2 (photo KM)



Fig. 14. Sampling site 20160819.3 (photo KM)



Fig. 15. Sampling site 20160819.1 (photo IM)

## Results

Table 2 and 3 provides a list of species for each locality. In table 2 Vitrinidae species are indicated only, table 3 contains the other molluscs in alphabetical order. All records are from within the boundaries of the National Park. In total, 39 species were found. In the first three columns of the tables, the results of 2012, 2013 and 2015 are summarized as well.

### Vitrinidae

Vitrinidae were recorded in 14 out of 20 sampling sites. On three sampling sites (12.1, 19.2 and 19.3) only Vitrinidae were found. On sampling site 12.1 (on several spots 12.1A-12.1G) a large amount of shells was found. In this paper, only the shells from 12.1A are included. The other records are discussed in another article (Margry, in preparation). In total six live animals and 388 empty shells were collected. From those 388 empty shells, 360 could be identified. The other shells were damaged too much.

|                             |   | 2012 | 2013 | 2015 | Aussois | Entre Deux Eaux              | Termignon   | Bessans              | Col de l'Iseran    | Bonneval-sur-Arc  | sum total 2016 |
|-----------------------------|---|------|------|------|---------|------------------------------|-------------|----------------------|--------------------|---|----------------|
| Sampling nr                 |   |      |      |      | 06.2    | 09.1<br>09.2<br>09.3<br>09.4 | 9.7<br>10.1 | 11.1<br>11.3<br>11.4 | 12.1A <sup>#</sup> | 19.1 <sup>#</sup><br>19.2 <sup>#</sup><br>19.3 <sup>#</sup> |                |
| <b>Vitrinidae</b>           |   |      |      |      |         |                              |             |                      |                    |   |                |
| <i>Vitrina pellucida</i>    | a | 1    | 0    | 3    | -       | 1                            | -           | -                    | 1                  | -   | 2              |
|                             | d | 2    | 30   | 33   | -       | 6                            | 7           | -                    | 227                | -   | 240            |
| <i>Phenacolimax stablei</i> | a | 0    | 0    | 4    | -       | -                            | -           | -                    | -                  | -   | 0              |
|                             | d | 0    | 36   | 39   | -       | 1                            | -           | -                    | -                  | -   | 1              |
| <i>Eucobresia glacialis</i> | a | 15   | 0    | 5    | -       | -                            | -           | -                    | -                  | -   | 0              |
|                             | d | 25   | 3?   | 51   | -       | -                            | -           | -                    | -                  | -   | 0              |
| <i>Eucobresia nivalis</i>   | a | 0    | 4    | 2    | -       | 1                            | 1 juv       | -                    | -                  | -   | 2              |
|                             | d | 12   | 48   | 133  | -       | -                            | 15          | -                    | 17                 | 27  | 59             |
| <i>Oligolimax annularis</i> | a | 0    | 0    | 0    | -       | -                            | -           | 2 juv                | -                  | -   | 2              |
|                             | d | 0    | 0    | 18   | 12      | -                            | -           | 48                   | -                  | -   | 60             |
| not identified              | a |      |      |      | -       | -                            | -           | -                    | -                  | -   | 0              |
|                             | d | 0    | 0    | 46   | -       | -                            | 6           | -                    | 20                 | 2   | 28             |
| sum total                   |   |      |      |      | 12      | 9                            | 29          | 50                   | 265                | 29  | 394            |

Table 2. List of Vitrinidae species for each locality with combined sampling sites. a = alive, d = empty shell.

<sup>#</sup> Sampling sites where only Vitrinidae were found.

Four vitrinid species were identified within the National Parc:

#### *Vitrina pellucida* Semilimace commune

In total 2 living specimens and 240 empty shells from 3 sampling sites in the region of Entre Deux Eaux, Termignon and Col de l'Iseran.

#### *Phenacolimax stablei* Semilimace des alpages

In total 1 empty shell from the sampling site 9.1 in Entre Deux Eaux.

#### *Eucobresia nivalis* Semilimace des neiges

In total 2 living specimens and 59 empty shells from 7 sampling sites in the region of Entre Deux Eaux, Termignon, Col de l'Iseran and Bonneval-sur-Arc.

#### *Oligolimax annularis* Semilimace globuleuse

In total 2 living juvenile specimens and 60 empty shells from 4 sampling sites in the region of Aussois and Bessans.

On sampling site 20160810.1 a dropping or bird pellet (15 x 6,5 x 6,5 mm) was found from an unidentified animal. In the dropping, empty shells from Vitrinidae are visible (Figs. 16-18).



Fig. 16.



Fig. 17.



Fig. 18.

Figs 16-18. Dropping or pellet, found on sampling site 20160810.1. Fig 16 and 17: showing shells from Vitrinidae and a leg from a grasshopper. Fig. 18. Detail with shells of Vitrinidae (photos IM)

#### Other molluscs (Figs 19-20)

On 17 out of the 20 sampling sites, 35 mollusc species other than Vitrinidae were recorded. On 6 sampling sites only other mollusc species were found.

Two slugs and a *Radix* could be identified by anatomical research: *Arion subfuscus*, *Deroceras agreste* and *Radix labiata* (Fig. 19).

None of the specimens from the genus *Euconulus* could be identified using Falkner et al. (2002: 120-122) and Gargominy & Ripken (2011: 48) and were listed as *Euconulus* spec.

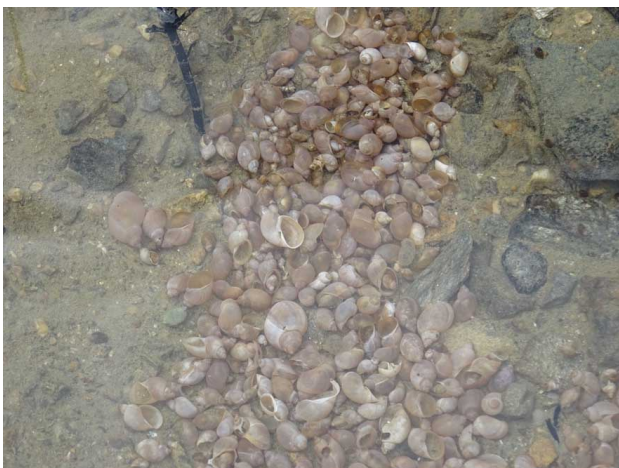


Fig. 19. *Radix labiata* in 'Lac des Limnées' 20160809.7 (photo AT)



Fig. 20. *Arianta arbustorum* 20160809.1 (photo IM)

|                                       | 2012 | 2013 | 2015 | Aussois       | Entre Deux Eaux                                | Termignon             | Bessans                       | Col de L'iseran | Bonneval -sur-Arc             |
|---------------------------------------|------|------|------|---------------|--|-----------------------|-------------------------------|-----------------|-------------------------------|
|                                       |      |      |      | 06.1*<br>06.2 | 09.1<br>09.2<br>09.3<br>09.4<br>09.5*<br>09.6* | 09.7<br>10.1<br>10.2* | 11.1<br>11.2*<br>11.3<br>11.4 | (12.1A)         | 19.1<br>19.2<br>19.3<br>19.4* |
| <b>Other molluscs</b>                 |      |      |      |               |  |                       |                               |                 |                               |
| <i>Aegopinella minor</i>              |      |      | X    |               |  |                       | X                             |                 |                               |
| <i>Aegopinella nitens</i>             |      | X    |      | X             |  |                       |                               |                 |                               |
| <i>Aegopinella pura</i>               | X    | X    |      | X             |  |                       |                               |                 |                               |
| <i>Arianta arbustorum</i>             | X    | X    |      |               | X  |                       |                               |                 |                               |
| <i>Arion subfuscus</i>                |      | X    |      |               | AT   |                       | AT                            |                 |                               |
| <i>Candidula unifasciata</i>          |      |      | X    |               | X  |                       | X                             |                 |                               |
| <i>Causa holosericea</i>              |      |      |      | X             |  |                       |                               |                 |                               |
| <i>Cepaea sylvatica</i>               |      | X    | X    | X             |  | X                     |                               |                 |                               |
| <i>Chilostoma fontenillii alpinum</i> |      | X    | X    |               |  |                       |                               |                 |                               |
| <i>Chilostoma glaciale</i>            | X    |      |      |               | X  |                       |                               |                 |                               |
| <i>Chilostoma zonatum flavovirens</i> | X    | X    | X    |               |  |                       |                               |                 |                               |
| <i>Clausilia dubia</i>                |      | X    |      |               |  |                       |                               |                 |                               |
| <i>Cochlicopa lubrica</i>             |      | X    |      |               | X  |                       |                               |                 |                               |
| <i>Cochlicopa lubricella</i>          | X    | X    | X    | X             | X  |                       |                               |                 |                               |
| <i>Cochlodina laminata</i>            | X    |      |      |               |  |                       |                               |                 |                               |
| <i>Columella columella</i>            | X    | X    |      |               |  |                       |                               |                 |                               |
| <i>Deroceras agreste</i>              |      |      | X    |               | AT   |                       |                               |                 |                               |
| <i>Discus rotundatus</i>              | X    |      |      |               |  | X                     |                               |                 |                               |
| <i>Discus ruderatus</i>               |      | X    | X    | X             | X  |                       |                               |                 |                               |
| <i>Ena Montana</i>                    | X    | X    |      |               |  |                       |                               |                 |                               |
| <i>Euconulus spec.</i>                | X    | X    | X    | X             | X  | X                     | X                             |                 |                               |
| <i>Euglesa casertana</i>              |      |      | X    |               | X  |                       |                               |                 | X                             |
| <i>Euglesa obtusalis</i>              |      |      |      |               |  | AT                    |                               |                 |                               |
| <i>Galba truncatula</i>               |      |      |      |               | X  |                       |                               |                 | X                             |
| <i>Granaria stabilei</i>              |      |      |      |               |  |                       | X                             |                 |                               |
| <i>Helix pomatia</i>                  |      | X    | X    |               |  |                       | X                             |                 |                               |
| <i>Isognomostoma isognomostoma</i>    |      | X    |      |               |  |                       |                               |                 |                               |
| <i>Jaminia quadridens</i>             |      | X    |      |               | X  |                       | X                             |                 |                               |
| <i>Lehmannia rupicola</i>             |      |      | X    |               |  |                       |                               |                 |                               |
| <i>Limax cinereoniger</i>             |      | X    |      |               |  |                       |                               |                 |                               |
| <i>Macrogastra plicatula</i>          | X    |      |      | X             |  |                       |                               |                 |                               |
| <i>Malacolimax tenellus</i>           | X    |      |      |               |  |                       |                               |                 |                               |
| <i>Merdigera obscura</i>              |      | X    |      | X             |  |                       |                               |                 |                               |
| <i>Morlina glabra</i>                 |      | X    |      |               |  |                       |                               |                 |                               |
| <i>Nesovitrea hammonis</i>            |      | X    |      |               | X  |                       |                               |                 |                               |
| <i>Nesovitrea petronella</i>          | X    | X    |      |               | X  | X                     |                               |                 |                               |
| <i>Oxychilus clarus</i>               |      |      |      |               |  |                       | X                             |                 |                               |
| <i>Petasina edentula</i>              |      | X    |      | X             |  |                       |                               |                 |                               |
| <i>Punctum pygmaeum</i>               | X    | X    |      |               |  |                       |                               |                 |                               |
| <i>Pupilla muscorum</i>               |      |      |      |               | X  |                       |                               |                 |                               |
| <i>Pupilla sterrii</i>                |      |      |      |               |  |                       | X                             |                 |                               |
| <i>Pyramidula pusilla</i>             | X    | X    | X    |               |  | X                     | X                             |                 |                               |
| <i>Radix cf labiata</i>               |      |      | X    |               |  | AT                    |                               |                 |                               |
| <i>Succinella oblonga</i>             |      |      |      |               | X  |                       |                               |                 |                               |
| <i>Tandonia rustica</i>               |      | X    |      |               |  |                       |                               |                 |                               |
| <i>Urticicola glabellus</i>           |      |      |      | X             |  |                       |                               |                 |                               |
| <i>Vallonia costata</i>               |      |      | X    |               | X  |                       | X                             |                 |                               |
| <i>Vitrea crystalline</i>             |      |      |      |               | X  |                       |                               |                 |                               |
| <i>Vitrea subrimata</i>               | X    | X    |      |               |  |                       |                               |                 |                               |
| Hygromiidae indet                     | X    |      |      |               |  |                       |                               |                 |                               |

Table 3. List of other mollusc species than Vitrinidae for each locality with combined sampling sites, in alphabetical order. In the first indicated columns the previously recorded results from within the boundaries of the Parc national de la Vanoise are given (2012, 2013 and 2015). AT are species dissected by A. Thomas.  
\* Sampling sites where no vitrinid snails were found.

Samples from 2016, that contain Vitrinidae species only were collected on altitudes between 2739 and 2801 m.a.s.l. Samples that contain only other species were collected between 1900 and 2690 m.a.s.l. Samples that contain both Vitrinidae and other species were collected in samples between 1750 and 2342 m.a.s.l.



## Discussion

In 2012, 2013, 2015 and 2016, a total of 55 species (including 1 unidentified Hygromiidae species) were found within the boundaries of Parc national de la Vanoise; 5 Vitrinidae and 50 other mollusc species. In 2016, 9 species were found for the first time.

One keeled specimen with a width of 7,6 mm could not be identified (sampling site 20160806.2; Fig. 21). It probably belongs to the genus *Urticicola*. It might be an aberrant form. Identification as *Ciliella ciliata* (Studer, 1820) (Veloutée ciliée) could be excluded. Similar specimens have to be collected alive in order to identify this species.

In 2013, 8 species were found only in the bufferzone (AOA = Aire Optimale d'Adhésion):

*Acanthinula aculeate*, *Bradybaena fruticum*, *Chondrina avenacea*, *Columella edentula*, *Helicodonta obvoluta*, *Macrogastra attenuata lineolata*, *Pupilla spec.* and *Zebrina detrita*. Due to the two recorded *Pupilla* species of this year, a total of 7 instead of 8 additional species were recorded. Therefore a total of 62 species are now recorded in the National Parc if the buffer zone is included as well. All those species are known from la région Rhône-Alpes, although *Aegopinella pura* and *Vitrea crystallina* not are listed for departement Savoie (n° 73) (Audibert, 2010a, 2010b)

### Vitrinidae:

Just like in 2015, hardly any living animals were found inside the National Park. However multiple empty shells were collected. Empty shells were compared with shells of dissected animals from previous years and other localities. The shell from *Phenacolimax* most likely belonged to *P. stabilei*. According to Gavetti et al. (2008), *P. locardi* is a species from the lower parts of the mountains (800 – 1800 m.a.s.l.) and *P. stabilei* from higher altitude (up to 2900 m.a.s.l.). In 2013, the *Phenacolimax* specimens were found on localities at 1906, 1960, 2331, 2372 and 2378 m.a.s.l., in 2015 they were found on 2247, 2361, 2397, 2410-2450 and 2739 m.a.s.l. In the present current study the shell was found on 2052 m.a.s.l. The occurrence of *P. stabilei* in Parc national de la Vanoise was confirmed earlier already (Margry, 2014; 2016a). Besides the search for *P. locardi* it is still interesting to involve the distribution of *Phenacolimax major* in the Alps as well. According to Welter-Schultes (2012), in France this species can possibly be found to an altitude of 1700 m. In the research of 2015, *Oligolimax annularis* was recorded for the first time (2326 m.a.s.l.). In the current study, more specimens were found at lower altitudes; 1750 m (06.2), 1905 m (11.1), 2024 (11.4) and 2102 m.a.s.l. (11,3). Also, all records for this species are from the sunny southern slopes of the Vanoise in the Maurienne valley.

Until present *Eucoberesia diaphana* was not found in Parc national de la Vanoise.

In the dropping or pellet (Figs 16-18) many parts of insects are visible. If this is a dropping, it has to be from an insectivorous mammal like e.g. the Western Hedgehog. Western hedgehogs (*Erinaceus europaeus* Linnaeus, 1758; hérisson) are found at altitudes up to 2000 m.a.s.l. (Twisk et al., 2010). The sampling site was at 2342 m altitude. Also the periostracum on the shells was still glossy and the fragments rather big indicating that it is less likely that this part has passed through the digestive system of a mammal. Therefore, it is more likely to be a pellet, and according to the measurements of the pellet, from a bird like e.g. a red-backed shrike (*Lanius collurio* Linnaeus, 1758; Pie-grièche écorcheur) (van Diepenbeek, 1999). In conclusion, the predator is still uncertain.

For a better understanding of the distribution patterns, the life cycles and ecology of Vitrinidae, more studies will need to be done. Anatomical research and measurements of the shells from specimens from the Vanoise will be included in a future study on Vitrinidae, which will include other parts of the French Alps as well. These data can contribute to other study, e.g. on possible impacts related to climate change (Müller et al., 2009).

The European Environment Agency (EEA, 2015) has indicated that the effects of climate change can vary greatly in different regions. For the mountain areas they indicate that more glaciers will melt, that the temperature will increase more than the average for Europe and that in mountain regions is a greater risk of extinction of species. This could be a severe problem especially for typical species in the nival vegetation belt such as *Eucoberesia glacialis*.

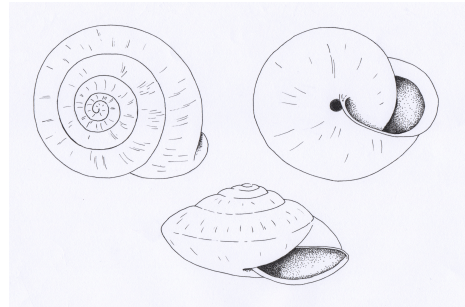


Fig. 21. Unidentified specimen

## Acknowledgements

The author would like to thank Jérôme Cavailhes for the provided authorization for the research in the National Park (Décision nominative n° 2016-377), Joël Blanchemain from the National Park for his guidance, for taking us by car to Entre Deux Eaux and for arranging our stay in Refuge du Plan du Lac. Thanks to Alain and Michelle Thomas (Fig. 22) who joined and guided us for three days in a very friendly way. Alain also helped me with provision of literature, information about his records in Parc national de la Vanoise, the identification of slugs, *Radix labiata* and pea mussels and the French abstract of this paper. Thanks as well to Joop Eikenboom, Theo Ripken, Edi Gittenberger, Wim Maassen, Herman Roode, Bert Janssen and Aart van den Berg for their help with the identification of some species other than Vitrinidae. Last but not least, I would like to thank my wife Ingrid for her help with the fieldwork and all the photos she took.



Fig. 22. From left to right: Michelle and Alain Thomas, Kees and Ingrid Margry

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### Appendix 1a. French names of the Vitrinidae in this report.

| Vitrinidae   |                        |
|--|------------------------|
| <i>Eucobresia diaphana</i> (Draparnaud, 1805)        | Semilimace aplatie     |
| <i>Eucobresia nivalis</i> (Dumont & Mortillet, 1854) | Semilimace des neiges  |
| <i>Eucobresia pegorarii</i> (Pollonera, 1884)        | (not available)        |
| <i>Eucobresia glacialis</i> (Forbes, 1837)           | Semilimace recouverte  |
| <i>Vitrina pellucida</i> (O.F. Müller, 1774)         | Semilimace commune     |
| <i>Phenacolimax major</i> (A. Férussac, 1807)        | Semilimace des plaines |
| <i>Phenacolimax stabilei</i> (Lesson, 1880)          | Semilimace des alpages |
| <i>Phenacolimax locardi</i> (Pollonera, 1884)        | (not available)        |
| <i>Oligolimax annularis</i> (S. Studer, 1820)        | Semilimace globuleuse  |

## Appendix 1b. French names of the other molluscs in this report.

| other molluscs   |                             |
|--|-----------------------------|
| <i>Acanthinula aculeata</i> (O.F. Müller, 1774)                  | Escargotin hérisson         |
| <i>Aegopinella minor</i> (Stabile, 1864)                         | Luisantine intermédiaire    |
| <i>Aegopinella nitens</i> (Michaud, 1831)                        | Luisantine ample            |
| <i>Aegopinella pura</i> (Alder, 1830)                            | Petite luisantine           |
| <i>Arianta arbustorum alpicola</i> (A. Férussac, 1821)           | Hélice des Alpes            |
| <i>Arion subfuscus</i> (Draparnaud, 1805)                        | Loche roussâtre             |
| <i>Bradybaena fruticum</i> (O.F. Müller, 1774)                   | Hélice cerise               |
| <i>Candidula unifasciata</i> (Poiret, 1801)                      | Hélicette du thym           |
| <i>Causa holosericea</i> (S. Studer, 1820)                       | Fausse veloutée plane       |
| <i>Cepaea sylvatica</i> (Draparnaud, 1801)                       | Escargot des forêts         |
| <i>Chilostoma fontenillii alpinum</i> (Michaud, 1831)            | Hélicon des préalpes        |
| <i>Chilostoma glaciale</i> (A. Férussac, 1832)                   | Hélicon des Alpes           |
| <i>Chilostoma zonatum flavovirens</i> (Dumont & Mortillet, 1852) | Hélicon des granites        |
| <i>Chondrina avenacea</i> (Bruguière, 1792)                      | Maillot avoine              |
| <i>Clausilia dubia</i> Draparnaud, 1805                          | Clausilie douteuse          |
| <i>Cochlicopa lubrica</i> (O.F. Müller, 1774)                    | Brillante commune           |
| <i>Cochlicopa lubricella</i> (Rossmässler, 1834)                 | Petite brillante            |
| <i>Cochlodina laminata</i> (Montagu, 1803)                       | Fuseau commun               |
| <i>Columella columella</i> (G. von Martens, 1830)                | Columelle alpine            |
| <i>Columella edentula</i> (Draparnaud, 1805)                     | Columelle édentée           |
| <i>Deroceras agreste</i> (Linnaeus, 1758)                        | Loche blanche               |
| <i>Discus rotundatus</i> (O.F. Müller, 1774)                     | Bouton commun               |
| <i>Discus ruderatus</i> (W. Hartmann, 1821)                      | Bouton montagnard           |
| <i>Ena montana</i> (Draparnaud, 1801)                            | Bulime montagnard           |
| <i>Euconulus spec.</i> Reinhardt, 1883                           | Conule                      |
| <i>Euglesa casertana</i> (Poli, 1791)                            | Pisidie robuste             |
| <i>Euglesa obtusalis</i> (Lamarck, 1818)                         | Pisidie de Lamarck          |
| <i>Galba truncatula</i> (O.F. Müller, 1774)                      | Limnée épaulée              |
| <i>Granaria stabilei</i> (E. von Martens, 1865)                  | Maillot montagnard          |
| <i>Helicodonta obvoluta</i> (O.F. Müller, 1774)                  | Veloutée plane              |
| <i>Helix pomatia</i> Linnaeus, 1758                              | Escargot de Bourgogne       |
| <i>Isognomostoma isognomostoma</i> (Schröter, 1784)              | Hélice grimace              |
| <i>Jaminia quadridens</i> (O.F. Müller, 1774)                    | Bulime inverse              |
| <i>Lehmannia rupicola</i> Lessona & Pollonera, 1882              | Limace des montagnes        |
| <i>Limax cinereoniger</i> Wolf, 1803                             | Grande limace               |
| <i>Macrogastra attenuata lineolata</i> (Held, 1836)              | Massue orientale            |
| <i>Macrogastra plicatula</i> (Draparnaud, 1801)                  | Massue costulée             |
| <i>Malacolimax tenellus</i> (O.F. Müller, 1774)                  | Limace jaune                |
| <i>Merdigera obscura</i> (O.F. Müller, 1774)                     | Bulime boueux               |
| <i>Morlina glabra</i> (Rossmässler, 1835)                        | Luisant étroit              |
| <i>Nesovitrea hammonis</i> (Strøm, 1765)                         | Luisantine striée           |
| <i>Nesovitrea petronella</i> (L. Pfeiffer, 1853)                 | Luisantine brune            |
| <i>Oxychilus clarus</i> (Held, 1838)                             | Luisant cryptique           |
| <i>Petasina edentula</i> (Draparnaud, 1805)                      | Veloutée alpine             |
| <i>Punctum pygmaeum</i> (Draparnaud, 1801)                       | Escargotin miniscule        |
| <i>Pupilla muscorum</i> (Linnaeus, 1758)                         | Maillot des mousses         |
| <i>Pupilla sterrii</i> (Voith, 1840)                             | Maillot des rochers         |
| <i>Pyramidula pusilla</i> (Vallot, 1801)                         | Pyramidule commun           |
| <i>Radix labiata</i> (Rossmässler, 1835)                         | Limnée radis                |
| <i>Succinella oblonga</i> (Draparnaud, 1801)                     | Ambrette terrestre          |
| <i>Tandonia rustica</i> (Millet, 1843)                           | Pseudolimace chagrinée      |
| <i>Urticicola glabellus</i> (Draparnaud, 1801)                   | Fausse-veloutée des vallées |
| <i>Vallonia costata</i> (O.F. Müller, 1774)                      | Vallonie costulée           |
| <i>Vitrea crystallina</i> (O.F. Müller, 1774)                    | Cristalline commune         |
| <i>Vitrea subrimata</i> (Reinhardt, 1871)                        | Cristalline méridionale     |
| <i>Zebrina detrita</i> (O.F. Müller, 1774)                       | Bulime zébré                |