

The Norwegian species of *Villa* Lioy, 1864 (Diptera, Bombyliidae)

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The Norwegian fauna of the genus *Villa* Lioy, 1864 is reviewed. Eight species have been found in Norway. The first valid records of the following species are given: *V. halteralis* (Kowarz, 1883), *V. longicornis* Lyneborg, 1965, *V. modesta* (Meigen, 1820), and *V. panisca* (Rossi, 1790). *V. occulta* (Wiedemann in Meigen, 1820) is reported new to Norway. A key to the Norwegian species is provided, as well as photographs of each species and maps showing the known distribution within Norway.

Key words: Diptera, Bombyliidae, *Villa*, Norway.

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Introduction

The genus *Villa* Lioy, 1864 consists of medium-sized flies with a short proboscis. They are covered in hairs and scales that vary from golden yellow to black and white, often with bands of bright scales on the abdominal tergites and with tufts of black and white or yellowish hairs at the end of the abdomen. The wings are mostly hyaline, only more or less darkened along the front edge. The morphological characters used for identification are vague and often easily destroyed, as the scales and hairs easily drop off or get damaged. Identification of the species is notoriously difficult, and the genus was left out when the family was reviewed by Falck & Greve (1999).

The genus is present on all continents except Antarctica, and comprises more than 260 described species (Evenhuis & Greathead 1999); 36 of these have been found in Europe (<http://faunaeur.org>). The Norwegian fauna comprises eight species. Thus *Villa* is the most numerous genus of Norwegian Bombyliidae, almost containing half the Norwegian species of the entire family.

The genus belongs to the part of the family in which the females have got a sand chamber, and it can be observed that the females are filling this chamber with sand, dust, saw-dust or other fine particles. This activity may be mistaken for ovipositing. It is supposed that it is undertaken to prevent the eggs from sticking together, as they are dropped one by one to the ground, presumably in the vicinity of a reasonably high density of suitable host individuals.

The first instar larva is inquiline, and is left to find its host by itself. The larvae parasitize the larvae of Noctuid moths (Lepidoptera, Noctuidae), but the host species are poorly known. Thus we do not know whether the *Villa* species are dependent of specific hosts, or can parasitize a number of species. The fact that several of the *Villa* species are connected with very specific habitats, like calcareous bare rock ground, sand dunes, or bogs, seems, however, to indicate the same in the host species. The pupa has thorns and hooks that enable it to break free from the host pupa. The adult flies visit flowers for nectar, but are most often sighted when they are resting on the ground in sun-exposed places. The males of some species

Table 1. Key to Norwegian species of *Villa* Lioy, 1864. See figure 1 for wing-details.

1. Wings dark brown to black coloured on the front edge.....	2
- Wings light brown to yellowish shaded along the front edge.....	5
2. Wings with extensive dark shading on frontal edge, extending outwards beyond crossvein r-m and backwards beyond Radial vein.....	3
- Wings narrowly coloured on frontal edge, the dark brown shading only covering the wing base, costal and first basal cell. Anal lobe narrow. Face with predominantly bright hairs, frons black-haired. Males with patagium with only dark scales, tergites and sternites without light scales. Female lacks bright scales on tergite 3, but has a band of whitish scales across the front end of tergites 2 and 4, of which the one on tergite 4 is the broadest, and often separated in the middle. Rear corners of tergite 5 and 6 with tufts of long black hairs, which gives a shining black appearance, contrasting with tufts of silvery white hairs on the sides of tergite 7.....	<i>Villa panisca</i> (Rossi, 1790)
3. Halteres dark brown to black.....	4
- Halteres fair, yellow to whitish. Body appears yellowish. Bands of light coloured scales on tergite 2 and 4.....	<i>Villa fasciata</i> (Meigen, 1804)
4. Facial hairs all black. Abdomen without yellow hairs, covered in black hairs, tufts of white hairs at both anterior and posterior corners, and with white scales forming a band across tergite 2 and 4.....	<i>Villa occulta</i> (Wiedemann in Meigen, 1820)
- Face with black and yellow hairs. Body more yellowish, with yellowish crossbands.....	<i>Villa halteralis</i> (Kowarz, 1883)
5. Males.....	6
- Females.....	9
6. Patagium silvery white.....	7
- Patagium dark brown, eventually with some yellowwhite scales intermixed... ..	<i>Villa hottentotta</i> (Linneus, 1758)
7. Abdomen without bands of bright scales.....	<i>Villa modesta</i> (Meigen, 1820)
- Tergites with bands of bright scales.....	8
8. Three bands of bright scales on abdomen: a broad band on tergite 4 and narrower bands on the hind margin of 5th and 6th tergite. Frons with both blackish and pale scales. Tergite 2 and 3 only laterally with some pale scales.....	<i>Villa cingulata</i> (Meigen, 1804)
- The black hairs on frons continuing as a wedge into the face along the eye rim. Bands of pale scales on tergite 2, 3 and 4, the band on tergite 3 narrow. The pale bands on tergite 5 and 6 occupying the posterior half of the tergite. The thin part of 3rd antennal segment constituting more than half the total length of the antenna.....	<i>Villa longicornis</i> Lyneborg, 1965
9. Tergites 2, 3 and 4 with nearly equally broad bands of bright scales, at sides reaching (almost) to the hind corner of the tergite. Especially the band on tergite 3 may be narrower in the middle, sometimes almost divided in two, but always covering more than half the side margin of the tergite. Occiput covered in golden yellow scales, the hair tufts on the side of tergite 7 golden yellow. Scales on dorsal side of hind tibia equal in length to the bristles.....	<i>Villa hottentotta</i> (Linneus, 1758)
- The bands on tergite 2, 3 and 4 not of the same width. Occiput with scales that are pale yellow (not golden yellow), and the tufts of hair on the side of tergite 7 pale yellow or white. The bright band on tergite 3 never covering as much as half the side of the tergite.....	10
10. The bright band of scales on tergite 4 broad, occupying most of the tergite. The band on tergite 3 very narrow, but clearly visible in fresh specimens. Tergite 7 in middle with numerous pale scales, forming a broad band. Hind tibia dorsally with scale hairs only about a quarter the length of the bristles.....	<i>Villa cingulata</i> (Meigen, 1804)
- The band of bright scales on tergite 2 broader than that on tergite 4. That on tergite 3 narrow, often hardly visible. Scale hairs on hind tibia more or less equal in length to the black bristles.....	11
11. Sternite 3 with mostly dark scale hairs. Anal lobe of wings broad. Hind margin of tergite 5 and 6 only vaguely equipped with light scales. Scapus (basal joint of antennae) with only black bristles.....	<i>Villa modesta</i> (Meigen, 1820)
- Sternite 3 covered with bright scale hairs. Anal lobe of wing narrow. Tergite 5 and 6 with obvious bands of bright scales posteriorly. Underside of scapus (basal joint of antennae) with yellow-white bristles.....	<i>Villa longicornis</i> Lyneborg, 1965

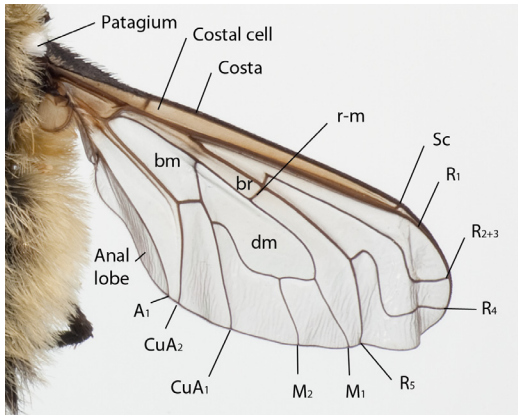


Figure 1. Wing of *Villa modesta* (Meigen, 1820). Abbreviations: **A** – Anal vein, **bm** – basal median cell, **br** – basal radial cell, **CuA** – Cubitus anterior, **dm** – distal median cell, **dm** – distal median cell, **M** – Medial vein, **r** – radius, **R** – Radial vein, **Sc** – subcosta. Photo: Karsten Sund.

have been observed to defend territories from conspecific males.

Material & Methods

The collections of Natural History Museum, University of Oslo (NHMO) and Zoological Museum, University of Bergen (ZMB) have been reviewed, as well as the private collection of Tore R. Nielsen (TRN), Sandnes, and the author's private collection (MF). Old literary records have also been reviewed, but due to the persistent insecurity of the species definition in the genus *Villa*, no record has been accepted unless the specimen has been seen and the determination verified by the present author.

Most of the material has been caught by net, and some in malaise traps. As the fluid of the traps usually ruins much of the scales and hairs that are necessary to identify the species, this method is not well suited for *Villa* spp.

The records are referred to the grid zones of the European Invertebrate Survey (EIS) (Endrestøl 2006) and to A. Strand's Norwegian reference system, as revised by Økland (Økland 1981)

Species with first valid record are marked with a "©", while species presently recorded as new to Norway are marked with an asterisk "*".

The Species

Villa cingulata (Meigen, 1804)

(Figure 2–3, Map 1)

Note: Siebke recorded this species as *Anthrax cingulata* Meig., from the Eastern side of the Oslo fjord: "Hab. Ad Sarpsborg (Grimsgaard), ad Christianiam (Juli) nec non in paroecia Asker mense Augusto (ipse)." This in contrast to the female specimen from Asker, and the specimen from Sarpsborg seems to be lost.

Records: The NHMO collection contains the following old material: **HES** Ringsaker: Helgøya (EIS 46), juli 1849 1 ♀ leg. Siebke, **AK** Kr.ania (= Oslo) (EIS 28) 1 ♂ 1 ♀. leg. Siebke, 1 ♀ leg. Esmark; Asker 5 august 1851 1 ♀ leg. Siebke; Bærum 2 ♀♀ leg. Schøyen. The ZMB collection has the following material: **VE** Sem: Teie (EIS 19) 26 juli 1890 1 ♀ leg. Bidekap, Sem: Slagen 25 juli 1890 1 ♀. leg. Bidekap. In addition there is the following new material: **VE** Tjøme: Sandøy (EIS 19) 7 june 1992 1 ♂ leg. Ø. Berg, **BØ** Drammen: Underlia (EIS 28) july 1993 1 ♂ leg. L.O. Hansen, both in coll. MF, **Ø** Rygge: Sildebauen (EIS 19) 13 august 2005 1 ♀ leg L. Aarvik, in coll. NHMO.

Recorded from the following EIS-squares: 19, 28 and 46.

Collecting period: 7 June–13 August.

Distribution: Finland, Sweden and the UK (Evenhuis & Greathead, 1999).

Comments: The very few recent records seem to indicate a decrease in occurrence, probably due to loss of habitat. However, it is not possible to say anything with certainty about its rarity, from the few records. The species is recorded from Sweden, Finland and Great Britain, but not from Denmark.

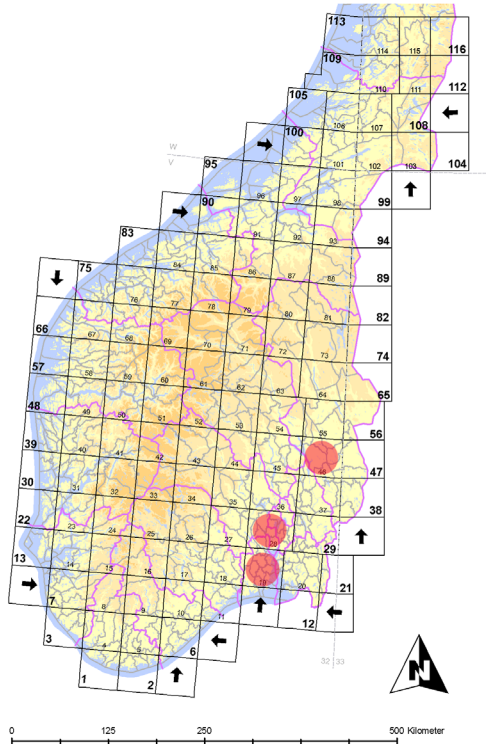
© *Villa fasciata* (Meigen, 1804)

(Figure 4, Map 2)

= *circumdata* (Meigen, 1820), *venusta* (Meigen, 1820)

Note: Siebke recorded this species under the name *Anthrax circumdata* Meig., from Christiania = AK: Oslo, but as no material exists to support this claim, it must be considered erroneous.

Records: There are three specimens from Norway: **AK**



Map 1. Distribution of *Villa cingulata* (Meigen, 1804). Map according to Endrestøl (2005).

Bærum: Ostoya (EIS 28) august-september 1984 2 ♀♀ leg. Fred Midtgaard, one lacking the head, the other labelled “Undeterminable, Lyneborg”, both in the ZMB collection, and AAI Bygland: Heddevika (EIS 9) 28 juli-27 august 1998, leg. K. Berggren, in the NHMO collection. All were collected in malaise traps.

Recorded from the following EIS-squares: 9 and 28.

Collecting period: 28 July–September.

Distribution: Denmark, Finland, Sweden and the UK (Evenhuis & Greathead, 1999).

Comments: The very few recent records seem to indicate a decrease in occurrence, probably due to loss of habitat. However, it is not possible to say anything with certainty about its rarity, from the few records. It seems that it has a population on the islands in the inner Oslofjord arera. This needs to be verified.



Figure 2. *Villa cingulata* (Meigen, 1804) (♂). Photo: Karsten Sund.



Figure 3. *Villa cingulata* (Meigen, 1804) (♀). Photo: Karsten Sund.

© *Villa halteralis* (Kowarz, 1883) (Figure 5, Map 3)

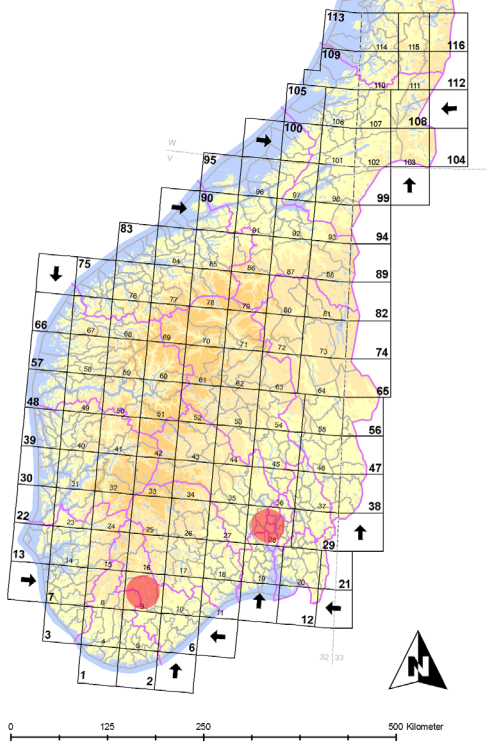
Records: There are four specimens in the old museum collections, viz.: AAY Arendal (EIS 6) juli 1883 1 ♂ 1 ♀ leg. Esmark, the female has lost its head, in the NHMO collection, and VE Sem: Fjugstad (EIS 19) 26 juli 1890 1 ♂ 1 ♀ leg. Bidekap, the female without head, labelled “*V. cingulata* Lyneborg 1986”, both in the ZMB collection. There is one new record: TEI Bø: Verpe (EIS 17) 1 august 1993, ♀ leg. Ø. Berg, in coll. MF.

Recorded from the following EIS-squares: 6, 17 and 19.

Collecting period: July–1 August.

Distribution: Recorded from Finland and Sweden, but not from Denmark or the UK (Evenhuis & Greathead, 1999).

Comments: A rare species, which seems to have an inland distribution, more than being associated



Map 2. Distribution of *Villa fasciata* (Meigen, 1804). Map according to Endrestøl (2005).



Figure 5. *Villa halteralis* (Kowarz, 1883) (♀). Photo: Karsten Sund.

with coastal habitats, though it may be distributed in more coastal habitats as well.

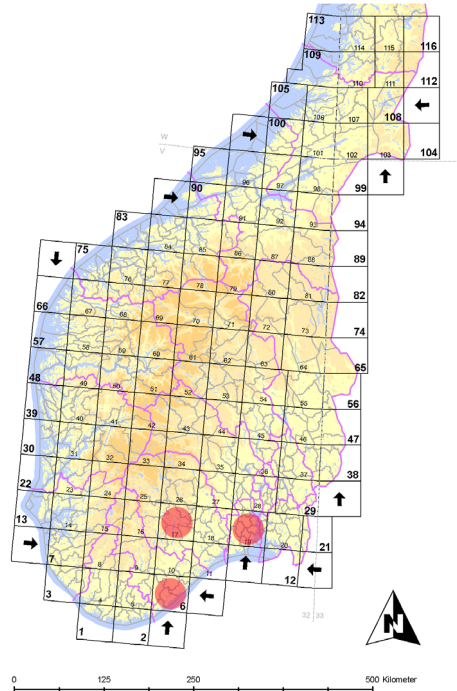
***Villa hottentotta* (Linneus, 1758)**

(Figure 6–7, Map 4)

Notes: Siebke notes this species under the name

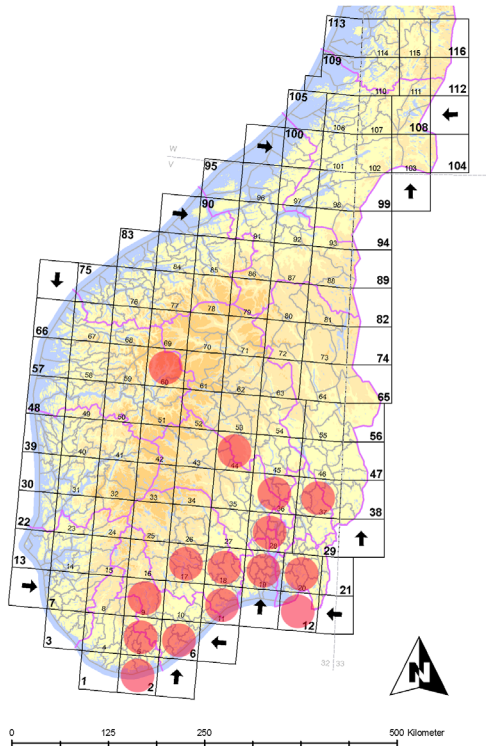


Figure 4. *Villa fasciata* (Meigen, 1804) (♀). Photo: Karsten Sund.



Map 3. Distribution of *Villa halteralis* (Kowarz, 1883). Map according to Endrestøl (2005).

Anthrax flava Meig. from AK: Oslo, Tøyen and Grefsenåsen, from AK: Asker, from VE: Stavem and from Ø: Sarpsborg. By far the most common Norwegian *Villa* species. A total of 215 specimens have been reviewed, making up the bulk of all the Norwegian collections.



Map 4. Distribution of *Villa hottentotta* (Linnaeus, 1758). Map according to Endrestøl (2005).

Records: Recorded localities are dispersed over both inland lowland and coastal districts of south-eastern Norway. The NHMO-collection and the ZMB-collection contains much of the old material confirming most of Siebke's records. There is one remarkable record falling outside of the general distribution pattern: **SFI** Luster: Høyheimsvik (EIS 60) 24 July 1945 1 ♀ leg. Knaben, coll. ZMB.

Recorded from the following EIS-squares: 2, 5, 6, 9, 11, 12, 17, 18, 19, 20, 28, 36, 37, 44 and 60.

Collecting period: 17 June–2 September.

Distribution: Recorded from Denmark, Finland, Sweden and the UK (Evenhuis & Greathead, 1999).

Comments: Ove Sørlibråten hatched two specimens of *V. hottentotta* from pupae of *Noctua pronuba* (Linnaeus, 1758). One of the specimens was lost, 1 male and the two pupariae with exuviae dated 4 May 1993 are in coll. MF.

A very variable species as to size and in the extent



Figure 6. *Villa hottentotta* (Linnaeus, 1758) (♂). Photo: Karsten Sund.



Figure 7. *Villa hottentotta* (Linnaeus, 1758) (♀). Photo: Karsten Sund.

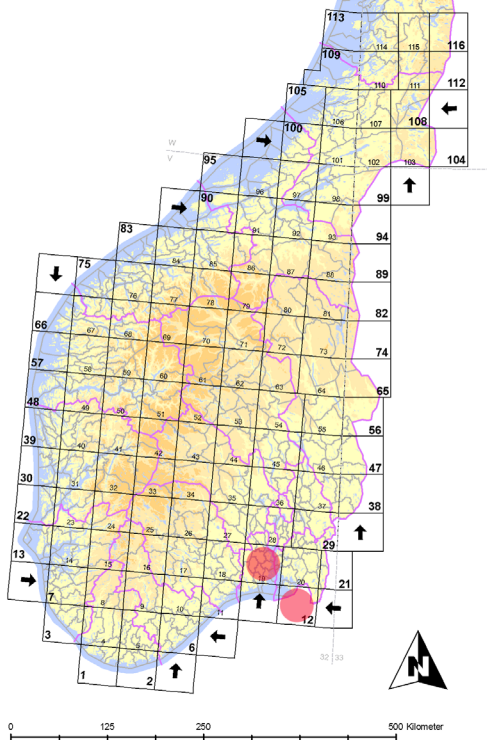
of light brown-yellowish infuscation on the front edge of the wings. Not found in England, and recently deleted from the Dutch list of species. (Beuck, 2002) However, it is clearly the most common and widely distributed of the Norwegian species, and is rather easy to recognise.

As it has been difficult to find good characteristics to separate this species from *V. modesta*, even in the male terminalia, the two have at times mistakenly been lumped together. In the Norwegian material, they are clearly different, both in morphology and in choice of biotope, but the separation may need access to a series of individuals, due to the intraspecific variation of both species.

© *Villa longicornis* Lyneborg, 1965

(Figure 8, Map 5)

Records: : VE Oddane (EIS 19) at sea shore 7 juli 1980 2 ♀♀ leg. L. Greve, det. L. Lyneborg; Tjøme 29 juni 1968 1 ♂ leg.



Map 5. Distribution of *Villa longicornis* (Lyneborg, 1965). Map according to Endrestøl (2005).



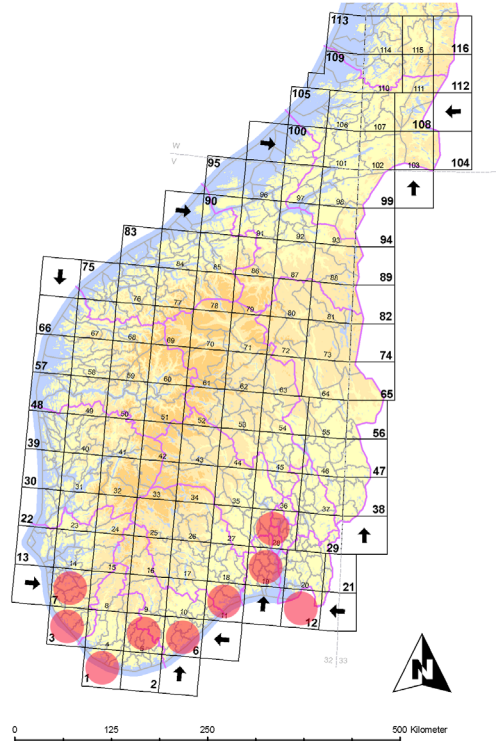
Figure 9. *Villa modesta* (Meigen, 1820) (♀). Photo: Karsten Sund.

A. Fjellberg, head missing, det. L. Lyneborg, all in ZMB. Ø Hvaler: Kirkøy, Ørekroken (EIS 12) 21 juni 1996 1 ♀ leg. M. Falck, in coll. MF.

Recorded from the following EIS-squares: 12 and 19.



Figure 8. *Villa longicornis* Lyneborg, 1965 (♀). Photo: Karsten Sund.



Map 6. Distribution of *Villa modesta* (Meigen, 1820). Map according to Endrestøl (2005).

Collecting period: 21 June–7 July.

Distribution: Recorded from Denmark, Finland and Sweden, but not from the UK (Evenhuis & Greathead, 1999).

Comments: Lyneborg described this species as a subspecies of *V. circumdata* (Meigen, 1820). *V.*



Figure 10. *Villa modesta* (Meigen, 1820) (♂).
Photo: Karsten Sund.

circumdata has later been shown to be a junior synonym of *V. fasciata* (Meigen, 1804). Rald (1975) raised it to species rank. This was followed by Evenhuis & Greathead (1999), and is also followed by The Diptera Site, The BioSystematic Database of World Diptera, (<http://www.sel.barc.usda.gov/Diptera/biosys.htm>). Being unable to find significant differences in the male genitalia, however, some recent authors (i.e. Zaitzev, 1989, and Fauna Europaea, (<http://www.faunaeur.org>)) tend to treat this species as a subspecies of *V. fasciata* (Meigen, 1804). As the true *fasciata* does occur very scarcely in Norway, and according to Swedish records, it is associated with calcareous soils, while *longicornis* seems also to be a rare species associated with sand dune localities, due to the obvious morphological differences, and the obvious differences in distribution probably reflecting differences in ecology, *V. longicornis* is here treated as a separate species. This also reflects views held by the present author on the concepts of species and subspecies.

© ***Villa modesta* (Meigen, 1820)**

(Figure 9–10, Map 6)

Records: A total of 96 specimens have been examined from sand-dune localities along the southern coast of Norway. There is no records from inland localities. The species seems to be abundant in localities such as Ø Hvaler: Kirkøy, Ørekroken (EIS 12), where the author collected 9 ♂♂ 3 ♀♀ 8 July 1994 and again 11 ♂♂ 5 ♀♀ 19 July 1995. The most western records are from RY Klepp: Orre (EIS 7) 14 August 1976 1 ♀, and 28 June 1982 1 ♂, both leg. T.R. Nielsen and in coll. TRN.

Recorded from the following EIS-squares: 1, 3,

5, 6, 7, 11, 12, 19 and 28.

Collecting period: 20 June–14 August.

Distribution: Recorded from Denmark, Sweden and the UK, but not from Finland (Evenhuis & Greathead, 1999).

Comments: As is the case for *V. hotentotta*, this species varies a great deal in size and in extent of coloration of the front edge of the wings. However, it is clearly a good species, strictly associated with sand dune localities, and the second most common species in Norway.

* ***Villa occulta* (Wiedemann in Meigen, 1820)**

(Figure 11–12, Map 7)

Records: HEN Trysil: Bakksetra (EIS 65) 18 July 2008 1 ♂, 19 July 2008 1 ♀, both leg. and in coll. MF. It was also recorded from a malaise trap in BV Rollag (EIS 35) (Hansen & Ruud, 2009).

Recorded from the following EIS-squares: 35 and 65.

Collecting period: July. In Sweden the dates extend from 12 July–14 August.

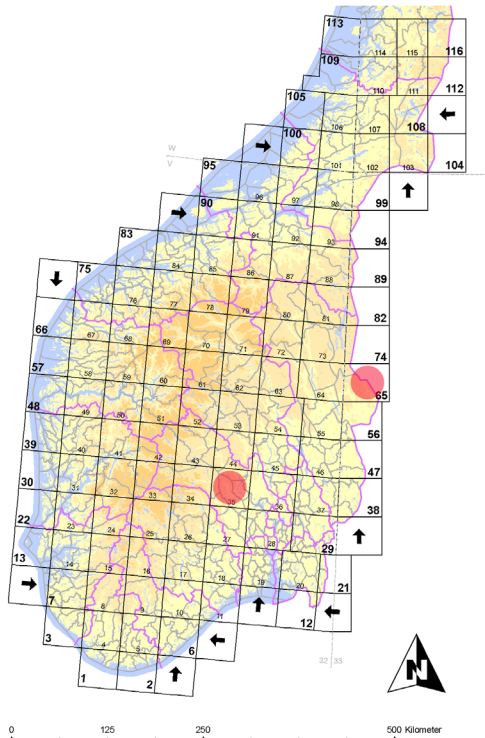
Distribution: Recorded from Denmark, Finland and Sweden, but not from the UK (Evenhuis & Greathead, 1999, Bartsch & Kronstedt, 2007).

Comments: This dark species has until now not been recorded from Norway. A paper by Bartsch & Kronstedt (2007) concerning the distribution in Sweden, showed that the species was not as rare as had earlier been presumed, but it had an unexpected habitat, flying on bogs in montane areas. As it was recorded from places close to the Norwegian border across from the Trysil area, the author undertook a search for it in the summer of 2008, resulting in the first Norwegian records. For an account see Falck (2009). This in turn led to discovery of the species in a Malaise trap sample from Rollag in Buskerud province. (Hansen & Ruud, 2009) These widely separated localities probably point to a wide distribution on acideous bogs in the southern part of the country. As it is recorded also from the northern parts of Sweden and Finland, there also is a possibility that it may be present further north in Norway.

© ***Villa panisca* (Rossi, 1790)**

(Figure 12–13, Map 8)

Note: Bidentkap (1892) in his list of Diptera from



Map 7. Distribution of *Villa occulta* (Wiedemann in Meigen, 1820). Map according to Endrestøl (2005).

Jarlsberg and Laurvigs amt records this species as “very common”. However he lists both *cingulata* and *modesta* as synonyms, which make his records very dubious.

Records: AK Bærum (EIS 28) 1 ♂ 2 ♀♀ leg. Schøyen in coll. NHMO. TEI Tokke: Flekkstveit (EIS 16) juli 1992 1 ♂ leg. L.O. Hansen, in coll. MF.

Recorded from the following EIS-squares: 16 and 28.

Collecting period: July.

Distribution: Recorded from Finland, Sweden and Denmark, but not the UK (Evenhuis & Greathead, 1999).

Comments: Bidentkap lists this species in his survey of the dipterous fauna in Jarlsberg and Laurvigs amt in the summer of 1891, and states that it is “very common” (Bidentkap, 1892.). There is no specimen in any collection to substantiate this claim. Either we have to ignore his record as unverifiable, or we may believe that the existing specimens ex coll. Bidentkap (2 *V. cingulata* ♀♀

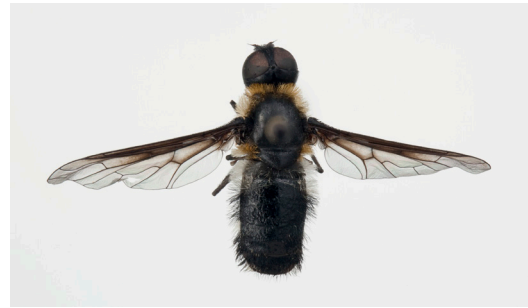


Figure 11. *Villa occulta* (Wiedemann in Meigen, 1820) (♂). Photo: Karsten Sund.

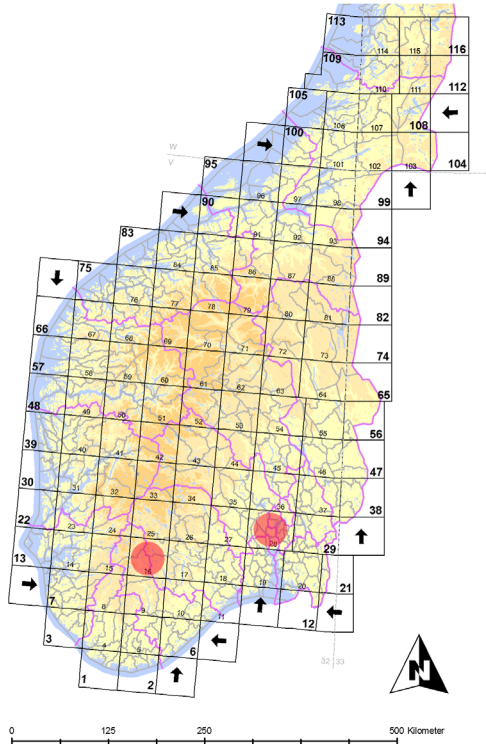


Figure 12. *Villa occulta* (Wiedemann in Meigen, 1820) (♀). Photo: Karsten Sund.

and 1 ♂ and 1 ♀ *V. halteralis*, see above) are the specimens Bidentkap is referring to, in spite of the fact that they are labelled 1890, and his report is about the summer of 1891. In either case we are left without verifiable records of *V. panisca* from Vestfold province.

Discussion

The genus *Villa* is notoriously problematic when it comes to identifying the species. This is due to the combination of great similarity of the species with regard to external characters and a great variation within the species. Thus the variation between species is often less than the variation within the same species. External characters that are useful to separate species are coloration of wings, coloration of hairs and scales on head, thorax and abdomen, the existence or not of bands of pale scales on the different tergites, the coloration of tegula/patagium and the tufts of hairs on the distal end of the abdomen, the coloration of the legs and



Map 8. Distribution of *Villa panisca* (Rossi, 1790). Map according to Endrestøl (2005).

the relative lengths of bristles and scales on the hind tibiae.

Thus it is necessary to compare as many as possible of these characters when identifying a specimen. The problem is not made simpler by the facts that these characters are very easily destroyed by moisture, rubbed off by the fly's busy, but normal, activity, or when it is netted and handled by the collector. To have fresh specimens is of great help, and it is often quite necessary to have long series, to see the extent of variation.

Unfortunately, the Norwegian material of several species is so restricted that it does not allow for making preparations of the male genitalia, which is the safest way to distinguish the species. Francois (1966, 1969) figures the male genitalia of most Norwegian species, while Lyneborg (1965) figures the genitalia of *V. longicornis*, *V. fasciata* and *V. modesta*.



Figure 13. *Villa panisca* (Rossi, 1790) (♂). Photo: Karsten Sund.



Figure 14. *Villa panisca* (Rossi, 1790) (♀). Photo: Karsten Sund.

However, it is possible to reach an understanding of the species from the external characters alone, and the key here presented uses exclusively such characters.

It is supposed that the difficulty in identifying the species and the lack of a comprehensive key to the Norwegian species has kept most collectors from collecting these flies. Thus the lack of knowledge has combined with the identification problems into a vicious circle, with the two sides reinforcing one another. It is hoped that the present key will help to break this vicious circle, and will lead to a progress in mapping the occurrence of the *Villa* species in Norway. However, in the material collected during recent

years, there are very few specimens of the rearer species, while the two common species make up an unproportionately great part of the records. This may point to a specialised biology in the rearer species, connecting them with biotopes that either are very rare or very vulnerable, and thus in sharp decline, or maybe with biotopes that are for some reason rarely visited by collectors.

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